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an investigation into the position of the environment within a New Institutional Economic framework and the development of Athenian institutions

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Athena's Trees: Olives, the environment, and the Athenian *polis* – an investigation into the position of the environment within a New Institutional Economic framework and the development of Athenian institutions.

Panayiotis M. Karageorgopoulos

A dissertation submitted to the University of Bristol in accordance with the requirements for award of the degree of MPhil in Ancient History in the Faculty of Arts

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Authors Declaration

I declare that the work in this dissertation was carried out in accordance with the requirements of the University's *Regulations and Code of Practice for Research Degree Programmes* and that it has not been submitted for any other academic award. Except where indicated by specific reference in the text, the work is the candidate's own work. Work done in collaboration with, or with the assistance of, others, is indicated as such. Any views expressed in the dissertation are those of the author.

SIGNED: P. M. Karageorgopoulos DATE: 03.08.2023

Abstract

New Institutional Economic (NIE) study of the ancient world has tended to neglect the importance of the environment's impact on economic, but especially non-economic, institutions. Often scholars leave both the natural and human-created environment out of their frameworks entirely. Whilst the study of the environment is a burgeoning area of ancient historical investigation, and some, including J. G. Manning (2020), do consider the importance of the environment in relation to economic activity, the broad impact of environmental factors on economic activities has not yet been fully considered. This thesis aims to position the environment within a NIE framework in order to reveal the impact that the environment had on ancient Greek, specifically Athenian, economic *and* non-economic institutions. Oliver Williamson outlined a useful and replicable framework for NIE analysis which I build on to create my own framework intended for analysis of the ancient Greek world. In this thesis, I combine features of environmental history with NIE in a manner which allows me to integrate the institution of the human-created environment at what Williamson calls the 'zero level' or the most embedded component of his framework (2000: 600). In this thesis, I discuss the current state of ancient NIE scholarship of the ancient world, before drawing on my case study of the olive, to demonstrate how the environment, impacts not only the orthodox economic realms of demography, agriculture, and prices, but also non-economic institutions, including religion, which can shape economic activity. I discuss the reforms of Solon as a way to demonstrate this range of environmental impacts on economic action. All of this allows me to answer the question of where the environment can be positioned in a NIE framework to elucidate how the environment impacted Athenian institutions.

Dedication and Acknowledgments

This thesis is dedicated to my grandparents: Panayiotis and Maria Karageorgopoulos, Jennifer Smith, and to the memory of my late grandfather Richard G. Smith.

I would also like to thank my parents for their endless support, Esther Eidinow and Edwin Shaw for their valuable guidance and infinite patience, and the department of Classics and Ancient History at the University of Bristol.

Abbreviations and Conventions

I have chosen to follow many latinised forms throughout this thesis thus Attica and not Attika, Athens not Athena, Draco not Drakon, Cylon not Kylon, etc. This is simply for coherence in English for commonly used nouns. Less common nouns appear in a close transliteration, thus Olynthos and not Olynthus, and Klazomenai as opposed to Clazomenai or Klazomenæ.

Very little appears abbreviated in my thesis, however, where it is convention, I have abbreviated ancient works using the abbreviations of the Oxford Classical Dictionary 4th Edition. An author's name in [] denotes the debate surrounding the authorship, e.g. [Aristotle] *Ath. Pol.*

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1. Introduction

This thesis aims to combine elements of environmental history with economic study to approach the question of how the environment can be integrated into a New Institutional Economic (NIE) framework. This may elucidate our understanding of how the environment influenced the development of the Athenian institutions. To illustrate the impact the environment had on both non-economic and economic institutions I will analyse the case study of the olive. NIE offers many benefits for analysis of the development of *poleis* in the ancient world. While NIE does utilise cliometrics, it also accounts for the embedded cultural backgrounds and material circumstances of societies. Thus, the approach is well suited to ancient history as precise cliometric analysis is particularly hard to complete on a large scale.¹ Whilst previous NIE studies are useful, I must build a new framework which takes into account the specificities of ancient institutions and fully considers the influence of the environment on institutions.

Alongside economics, the environment is one tangible way to access the ancient world. By the term environment I mean both the planet's 'natural' ecology and the 'human-created' environment which has been altered for cultivation or habitation.² The discipline of environmental history seeks to analyse societies' relationship to their environment.³ It is an interdisciplinary approach which studies 'the relations of culture, technology and nature' throughout different periods.⁴ Succinctly put, environmental history 'asks how nature influences humans, how humans intervene in nature and how nature and humans interact'.⁵ In modern studies, environmental history also contributes to our understanding of climate change which is not pertinent to my study of the ancient world.⁶ However, it is important to note how the environment shapes legislation in modern NIE study. For instance, environmental goals result in laws to address climate change.⁷ In the ancient world, the impact of the environment can be seen in the non-economic cultural and religious institutions. I argue that, despite its impact on the wider economy, the environment has been understudied within NIE. By building on Williamson's NIE framework and placing the environment in a wider institutional context,

¹ This is not to say that cliometric analysis is impossible in ancient economics, or that NIE neglects cliometric analysis, simply that NIE favours 'pluralism' which takes an interdisciplinary approach – see Williamson 2000: 595.

² Merchant 2012: 1.

³ Damodaran 2015: 747.

⁴ Ibid.

⁵ Brüggemeier 2001: 4621.

⁶ Hughes 2006: 77-78.

⁷ See also Paavola and Adger 2002: 1-31.

I aim to express how the environment was able to shape the culture and economy of a developing Athens at different levels of NIE analysis.⁸

To integrate the environment into a NIE framework I will consider the ‘human-created’ environment as an institution.⁹ This is separate from the ‘natural’ environment which cannot be called an institution because it is not a cultural norm, behaviour, or organisation. Nonetheless, the natural environment remains the biological reality in which all institutions exist and in some cases can shape history the way institutions do. The term natural environment refers to the atmosphere, hydrosphere, and lithosphere which societies inhabit. This is summarised by Horden and Purcell aptly: the atmosphere relates to ‘the climatic’ conditions, the lithosphere denotes the ‘reliefs’ of topography, i.e., landscape, and the hydrology refers to water – or indeed the sea.¹⁰ While the natural environment is our biological reality and humans exist within this ecosystem, it is the human networks, decisions, and behaviours within this ecosystem which can be used to define the institution of the human-created environment. This human-created environment encompasses the choices for habitation including both the location of urban environments, such as *poleis*, and areas of agricultural development.

This thesis will approach the ancient Attic environment in which the *polis* of Athens is situated. The Attic environment fits what Josiah Ober defines as the Greek ‘ecological niche’.¹¹ This ‘ecological niche’ includes areas which are close the coast (and natural harbours) and the climate is characterised by a warm winter and dry summer.¹² Ober notes that by the end of the Classical period, the Greeks ‘occupied all the [surrounding] territory in that niche.’¹³ The ecological niche that Ober describes can be considered ‘human-created’ as it was deliberately sought out by the Greek societies. For instance, natural harbours existed but the institutionalisation of that area to create a port is human-created. By approaching the ‘human-created’ environment as an institution I aim to elucidate ways in which Athenian institutions developed.¹⁴

⁸ Williamson 2000: 597.

⁹ Merchant 2012: 1. Williamson 2000: 600.

¹⁰ Horden and Purcell 2015: 179.

¹¹ Ober 2015: 26.

¹² Ibid.

¹³ Ibid.

¹⁴ Merchant 2012: 1.

The ecology of what Ober calls ‘core Greece’ has remained relatively constant for millennia.¹⁵ Knowledge of the modern Greek climate, soil conditions, rock formation, and the wider ecological environment can allow us to extrapolate data to understand conditions that the ancient Greeks may have faced. The Mediterranean has been the subject of historical studies before, from Fernand Braudel (1949; 1972) to Horden and Purcell (2000; 2015), and more recently J. G. Manning (2020).¹⁶ These histories of the Mediterranean each approach the subject from a different perspective. Braudel developed a *longue durée* approach, which he believed could perceive ‘history in slow motion’ allowing historians to detect the ‘permanent values’ of societies in different regions.¹⁷ Whereas Horden and Purcell challenged the more static approach of Braudel, noting the importance of the ‘connectivity’ between Mediterranean regions and how that brought about societal change.¹⁸ In turn, Manning looked towards the global climate to suggest how volcanic activity from outside the Mediterranean had consequences for Nile water levels, and thus crop failure/success.¹⁹ Nevertheless, it is clear that these scholars agree on the centrality of the environment in the development of history. In this thesis, I aim to explore the idea that the human-created environment plays a key role in shaping institutions, and that in doing so, the interaction of humans with their surrounding environment has clear economic ramifications. The conclusions I draw may elucidate how the environment has influenced the development of Athenian institutions.

The first research question of this thesis is: How might we incorporate the environment within a NIE framework that is applicable to the ancient world? NIE scholars have tackled the environment in the discipline of ancient history before. The work of Alain Bresson (2007-2008 and 2016a) and J. G. Manning (2020) both acknowledge the role of the environment in supply and demand, demography, and connectivity. Bresson discusses climatic variation and how this can impact food supplies resulting in subsequent ‘institutional interventions’ by *poleis* to prevent famines.²⁰ This is a solid foundation to build on; however, as I will argue, in Bresson’s *polis*-centric framework the environment does not receive enough attention. For Bresson, the environment is merely a ‘constraint’ and is encompassed by the wider institution of

¹⁵ Ober 2015: 22, 71. Core Greece refers to the territory controlled by the Greek state from 1881-1912.

¹⁶ Braudel’s *The Mediterranean and the Mediterranean World in the Age of Philip II* was first published in French in 1949. Throughout this thesis, I refer to the first English edition published in 1972. Horden and Purcell’s *The Corrupting Sea* was first published in 2000. However, I have consulted the second edition which was published in 2015.

¹⁷ Braudel 1972: 23.

¹⁸ Horden and Purcell 2015: 123.

¹⁹ Manning 2020: 170-171.

²⁰ Bresson 2016a: 431.

demography.²¹ By not treating the human-created environment as a separate institution it is difficult to demonstrate the impact of the environment, more broadly, on cultural and non-economic institutions. Manning utilises environmental events effectively, noting how volcanic eruptions can lead to atmospheric change and thus cause crop failure leading to social and political instability.²² Although these scholars demonstrate how the environment relates to economic activity, they do so without treating the environment independently in a framework. This makes it difficult to assess both the non-economic and economic impact of the environment.

To alleviate that challenge, I intend to position the environment within a framework of NIE and use that structure to trace the wider environmental impacts on Athenian institutions. To do this, I build on the work of Oliver Williamson. In 2000, Williamson published an article taking stock of NIE scholarship from the 20th century. From his findings he produced a framework explaining the hierarchy of different institutional levels from level one to four. He considered level one as the embedded cultural and religious level, level two as the level of property, judiciary matters, and bureaucracy, level three as the level of governance structures and transaction costs, and, finally, level four includes resource allocation, price, and neoclassical economic market analysis.²³ Williamson also hypothesises the existence of an additional pre-cultural ‘zero level’ which includes human psychological development but was hesitant to develop it further as this went beyond his aim of taking stock.²⁴ I intend to accept the existence of a ‘zero level’ and this is where I propose the environment could be added to a framework applicable to the ancient world.²⁵ This could be achieved by considering the human-created environment as an institution, whilst the natural environment is more broadly considered as an influence. The environment should not be exclusively considered as a ‘constraint’ which humans react to but as an influence on institutions; with the human-created environment being considered an independent institution.²⁶ This demonstrates why treating the environment at the zero level is useful as it allows for the simultaneous discussion of positive

²¹ Bresson 2016a: 22.

²² Manning 2020: 158-161, 170-171.

²³ Williamson 2000: 597.

²⁴ Williamson 2000: 600. Williamson was inspired by the work of psychologist Steven Pinker 1997. Perhaps, if Williamson had developed the zero level further we could posit that the environment may have been included as an influence on human development.

²⁵ Williamson 2000: 600.

²⁶ Bresson 2016a: 22.

and negative effects of the environment on non-economic and economic institutions, whilst still allowing for the integration of previous research on the environment and the economy.

My second research question is: If the environment can be integrated into a NIE framework, as I suggest, then how can we demonstrate its impact on the development of Athenian institutions? I have chosen to use the case study of the olive to explore this question. Attica has been inhabited since the Middle Neolithic Period and olive pollen has been ‘continually present’ in the Attic environment since at least 5,050 BCE.²⁷ There are ‘three marked increases’ in olive pollen data in circa. 3,750 BCE, 2850 BCE, and 2,250 BCE which demonstrate periods of olive cultivation.²⁸ Therefore, I argue the presence of the olive represents an element of the human-created Attic environment as a cultivated plant. The olive would become especially important to both the economic and non-economic institutions of Athens in the Archaic period; by which point Attic settlement patterns suggests the ‘entire plain of Athens... was considered by the inhabitants to be a geographical and economical unit’.²⁹ In the economic sphere, Athenian olive oil was considered a valuable commodity. This is partly because sacred oil was awarded to victors of the horseracing/ charioteering events at the Panathenaic games.³⁰ However, even before the introduction of the Great Panathenaia in 566/5 BCE sacred olive trees, *moriai*, were important to the Athenian cultural imaginary.³¹ The sanctification of the *moriai* predates Solon and symbolised the link between the *polis* and its eponym: Athena. Herodotus recounts the naming myth of Athens, where a competition is held between Poseidon and Athena to become the *polis*’ namesake.³² Athena gifts the Athenians an olive tree, triumphing over Poseidon’s gift of a saltwater spring. This demonstrates the influence of the environment on both the non-economic and economic institutions of Athens. I propose that the olive is a good entryway into this discussion because the olive crosses the religious realm with its importance in the Athenian cultural imaginary, the legislative realm with Solon’s export law, the legal realm in Lysias 7 regarding the removal of a *moria* stump, and the economic realm with the value of Athenian oil.³³

²⁷ Kyrikou et al. 2020: 33-34.

²⁸ Ibid.

²⁹ D’Onofrio 1997: 68.

³⁰ Bresson 2016a: 405. [Aristotle] *Ath. Pol.* LX.1-3.

³¹ Shear 2001: 3.

³² Herodotus *Hist.* 8.55.

³³ Plutarch *Solon* XXIV. Lysias 7 *Before the Areopagus: The Matter of the Olive-Stump.*

The scope of this thesis will focus on the Athenian *polis* from the Archaic period to the Classical era. Specifically, I will analyse the legislation of Solon, the legal dispute recorded in Lysias 7, and other institutional factors pertaining to the olive to argue that the environment can be assessed in a NIE framework at the zero level. The environment is a burgeoning topic in ancient history. Alain Bresson (2016a) and J. G. Manning (2020) note the importance of the environment, within their respective NIE studies, but neither treat the human-created environment as a separate institution or at what could be considered the zero level. By integrating the environment at the zero level of my NIE framework I aim to demonstrate the utility of considering the human-created environment as its own institution, gaining valuable insight into how it can impact both the non-economic and economic institutions.

In what follows, I discuss the discipline of environmental history and how environmental historians have approached Greek and Mediterranean history to date, its advantages, and its limitations. I argue that there is value in undertaking NIE analysis and building upon the existing NIE studies of ancient Greek history. Following this, I develop Williamson's framework to build a NIE framework which is applicable to the ancient world. I will use the case study of the olive to demonstrate how it might function, before offering my concluding thoughts, and how I believe this study could be useful to develop our understanding of the role of the environment in economic history.

2. Theory and Methodology

This chapter explores the environmental and economic historiography of the ancient Greek world. I outline the disciplines of environmental history and NIE and demonstrate how they have been applied in ancient history. I will discuss the work of Oliver Williamson, his framework for NIE analysis, and subsequent critiques of his work to inform my own framework. I identify the strengths and limitations of environmental and economic history to answer the question of how the environment could be positioned within a NIE framework and how this improves our understanding of how the environment shaped Athenian institutions.

2.1 Environmental History and the Ancient World

Environmental history is a subdiscipline in which scholars map the geographic and environmental conditions that interrelate with human development throughout history alongside the subsequent impact that humanity has on nature. One of the subdiscipline's most significant contributors was Fernand Braudel who in 1949 published *La Méditerranée et le*

monde Méditerranéen à l'époque de Philippe II.³⁴ Braudel found value in seeking history from the discipline of human geography, rejecting claims that his pursuit was 'determinist'.³⁵ To move past environmental determinism, whereby the actions of a society are predetermined by their environment, Braudel developed his idea of the *longue durée* of history. In his work, Braudel suggested that environmental analysis can 'help us to discover the almost imperceptible movement of history', and witness the 'unfolding of structural realities'.³⁶ For Braudel the environment was a constant background of humanity, crossing boundaries of 'time and space' and allowing us to perceive 'permanent values' of the Mediterranean region.³⁷ Braudel aimed to discover why the European world developed in the manner it did, and to illuminate these 'permanent values'; in other words, the constants which existed within the histories of the Mediterranean region.³⁸ With this foundation, Braudel set out to map the *longue durée* of Mediterranean history. Whilst he remains an influence on environmental historians, Braudel's generalisation of environmental influence on social development requires nuanced analysis. Take Braudel's treatment of mountain societies for example: 'mountains are as a rule a world apart from civilisations... their history is to have none', he adds, 'in the mountains then, civilisation is never stable'.³⁹ Whilst there is value in highlighting the differences in varied environmental regions and conditions, his generalisations were not always fair or useful as historical conclusions. Yet, his core ideas remain influential and his aim of revealing the environment's impact on history is important.

Environmental history gained popularity in North America in the 1970s following an increase in public consciousness surrounding our relationship with the planet and perhaps as a result of Braudel's work being translated into English.⁴⁰ In the early 1980s William Cronon, an American environmental historian, discussed human intervention in the natural world and the development of cities.⁴¹ Cronon would later be an influence on J. G. Manning, an ancient historian who, as I discuss, highlights the importance of environmental events.⁴² In the late 1980s, Donald Worster, who cited Braudel as an influence, discussed how the source material

³⁴ Broodbank 2013: 20 said 'Braudel is without doubt the most venerable [of the French environmental historians] and was the first to recognize the Mediterranean's unity and distinctiveness as a field of study'.

³⁵ Braudel 1972: 23.

³⁶ Ibid.

³⁷ Ibid.

³⁸ Ibid.

³⁹ Braudel 1972: 34-5.

⁴⁰ Cooper 2008.

⁴¹ Ibid.

⁴² Cronon 1983: vii is quoted in Manning 2020: 143.

for environmental history consists of ecological data including hydrological measurements of tides and currents, atmospheric data such as wind movement, and lithospheric data including the formation of continents.⁴³ From this source material Worster emphasises the impact of weather and climate on the quality of harvests which have ‘sent prices up or down, ended or promoted epidemics, [and] led to population increase or decline’.⁴⁴ Here we can begin to see how the environment intersects with the economy, which will be a fruitful avenue for discussion, but we must also note the work done in ancient environmental history.

At the turn of the 21st century, following the rise in popularity of environmental history, a pair of works were published dedicated to the topic of the ancient environment. Intending to move past the generalisations of Braudel and any accusation of environmental determinism, Peregrine Horden and Nicholas Purcell published *The Corrupting Sea* (2000) and Cyprian Broodbank published *An Island Archaeology of the Early Cyclades* (2000). Their aim was to demonstrate the influence the environment had on the development of different societies around the Mediterranean basin, societies which existed like ‘ants and frogs round a pond’.⁴⁵ These initial investigations would be followed by Broodbank’s *The Making of the Middle Sea* (2013) which focused on the ‘microcosm’ of Mediterranean development until the dawn of the classical world.⁴⁶ Broodbank’s work was directly influenced by Horden and Purcell’s output, which he called a ‘sea change’ that demonstrated, in a less ‘romantic’ manner than Braudel, ‘how things have happened in the Mediterranean’.⁴⁷ The focus of Horden and Purcell on connectivity is a key notion. If we accept that the environment lends itself to connections, both physical and cultural, then we can begin to see a new way in which the environment can impact both non-economic and economic institutions.

Horden and Purcell’s nuanced understanding of environmental history moves the debate forward from the initial work of Braudel and critiques his ‘contempt for “mere” events and “mere” individuals’.⁴⁸ Horden and Purcell also note how Braudel’s generalisations can be easily contradicted. For instance, contrary to Braudel’s assertion, political institutions can influence the *longue durée* for millennia, such as monarchy; whilst some environmental

⁴³ Worster 1989: 291.

⁴⁴ Ibid.

⁴⁵ Plato *Phaedo* 109B.

⁴⁶ Broodbank 2013: 20.

⁴⁷ Broodbank 2013: 19-21.

⁴⁸ Horden and Purcell 2015: 41.

factors, such as earthquakes, have short term effects perhaps with no lasting historical results.⁴⁹ This crystallises in their idea that environmental historiography can be conceptualised within a ‘larger phenomenon: the connectivity of microregions’.⁵⁰ For Horden and Purcell, connectivity plays an important role in Mediterranean history as it allowed communities to build relationships, spread information, and trade, thus shaping social, political, and economic history. Nevertheless, the environment does not shape history in a deterministic sense, rather, environmental conditions can work as catalysts (or prohibitors) of change which we can see within institutions. Overall, Horden and Purcell’s approach to the Mediterranean environment which draws on concepts of microregionality and connectivity to explain the influence of the environment is paradigmatic of the modern approach to environmental history. This clearly influences the work of Bresson (2016a) and Manning (2020) who I discuss below.

Broodbank and Horden and Purcell are right to suggest that the environment, through connectivity, can catalyse societal development. However, the role of the environment and its relationship to institutions is not fully considered in their work. This leaves room for NIE analysis to complement their research. Furthermore, as Harris and Lewis suggest, Horden and Purcell are reticent to mention the role of the *agora*, or ‘private entrepreneurs mining’ at Laurion.⁵¹ Thus, more analysis is required to map the connections between the environment and the economy. I argue that by formally situating the human-created environment as part of a NIE framework we can begin to trace this influence. To do this, I will first discuss the discipline of NIE and how it has already been utilised in ancient history. I will then outline a framework for NIE analysis before suggesting my own framework which incorporates my findings.

2.2 Ancient Economic History

To understand why NIE is a useful approach for ancient history it is necessary to first discuss the debates surrounding the ancient Greek economy which have shaped contemporary scholarship. One prominent figure in ancient economic study was Moses Finley.⁵² Finley rejected modernised approaches to the economy, denying the premise that the ancient world

⁴⁹ Horden and Purcell 2015: 41.

⁵⁰ Horden and Purcell 2015: 123.

⁵¹ Harris and Lewis 2016: 7.

⁵² Nafissi 2005: 280 suggests Finley was so idiosyncratic and influential he ‘not only produced a Finleyan primitivism and a Finleyan Athens, but also a Finleyan Weber, a Finleyan Polanyi, and above all a Finleyan Finley’.

was subject to cliometric analysis, or in his terms ‘number fetishism’.⁵³ He also rejected the idea of a market-based economy instead opting for a primitivist embedded approach. For Finley, the embedded nature of the economy, that is the idea that the economy did not exist as a separate entity in the ancient world but rather as embedded within other social structures, originates in the *oikos* debate. However, work by Morris, Cohen, Bresson, and Hinsch reveals that the Greek economy is not as primitive or embedded as Finley once thought and I will outline this debate below.

Finley believed that the Greek economy was embedded in other societal mechanisms because *oikos* translates as household. Thus, Finley interprets Xenophon’s *Oeconomicus* not as an economic thesis but rather as a didactic handbook on household management. Finley was correct to translate *oikos* in this manner; however, it does not disprove the existence of disembedded ideas of market functions, such as price fluctuations and supply and demand, in the ancient world. Bresson recounts an anecdote about a merchant, whose intended destination was the Black Sea, that arrives at Athens with a cargo of oil. The price of oil was inflated in Athens perhaps owing to a poor harvest. Therefore, the merchant decides to sell his oil, in Athens, at a higher price than he could have demanded in his intended destination. For Bresson, this raises the question of whether it was a genuine mistake on behalf of the merchant to come to Athens.⁵⁴ This suggests that market-orientated profit maximisation was a concern for ancient Greek merchants. Moreover, in direct response to the primitivist stance, Moritz Hinsch has recently questioned whether the role of the household is even a primitive concept, or whether the institutional flexibility of the household as an economic actor means that when more advanced economic scenarios occurred, such as the development of monetary trade, the household simply adapted to meet requirements.⁵⁵ Nevertheless, Finley is certain that ‘the inapplicability to the ancient world of a market-centred analysis was powerfully argued by Max Weber and... by Karl Polanyi. All to little avail’.⁵⁶ This situates Finley within a (left-wing) sociological approach which focuses on the embedded nature of the economy.⁵⁷ For Finley, the ancient economy is simply a by-product of social activity – inherently *embedded* within the society and not a market-centred operation.

⁵³ Finley 1999: 25. I have consulted the 25th anniversary edition of Finley’s *The Ancient Economy* which was first published in 1973. All references thus appear Finley 1999.

⁵⁴ Bresson 2016a: 383.

⁵⁵ Hinsch 2021: 17.

⁵⁶ Finley 1999: 26.

⁵⁷ I do not mean this as a criticism but rather as an acknowledgment of Finley’s political leaning. For more see: Urbainczyk 2006: 397 on Finley as a ‘Marxist historian’.

Finley's claim regarding the embedded nature of the ancient economy is often refuted and scholars have adopted a more disembedded view of how the ancient economy operated. In the foreword to the 25th anniversary edition of Finley's *The Ancient Economy*, Ian Morris suggested scholars should be wary of Finley's 'oversocialization'.⁵⁸ Morris draws on the work of Edward Cohen who states that 'Greek orators distinguished between a visible (*phaneros*) and invisible (*aphanes*) economy with banking and other financial activities falling into the latter'.⁵⁹ This dispels Finley's idea of an embedded Greek economy which lacked abstract, disembedded, or market-orientated economic thought. This disembedded view allows scholars to suggest there were incentives for growth in the Greek economy. For instance, Morris writes about the pursuit of *kerdos* (profit/gain) in *Hard Surfaces* (2002). This work focussed on the ideas of profit maximisation of 'wealthy farmers' in response to the Solonic reforms, which ended the 'quagmire of hektemorage'.⁶⁰ This would be followed up in 2004 with Morris's work tracing the growth of the Greek economy. Both works suggest there is value in growth orientated and 'neo-institutional approaches'.⁶¹ Alongside Morris's work, which aimed to prove that real economic growth occurred in the ancient Greek world, Josiah Ober rejected the long-held notion of Hellenic 'poverty' that had been gleaned by scholars from Herodotus.⁶² In fact, Ober suggests the 'Greeks were not poor' in comparison to other ancient and medieval societies.⁶³ This rejection of a long-held belief in Greek poverty would influence later NIE Greek historian Alain Bresson and is a cornerstone of his NIE approaches to the ancient world. Hirsch, who draws on Bresson, also suggests that the household, which has previously been regarded as primitive, had an important role in this economic activity.⁶⁴ Thus, this thesis argues in favour of the idea that the Greek economy was disembedded and capable of growth and I argue that one of the ways in which this was achieved was through the Greek relationship to the environment. The human-created environment impacted many aspects of the Greek economy and as such should be treated at an institutional level in a NIE analysis.

2.3 New Institutional Economics (NIE)

NIE is a tool for economists, economic historians, and political scientists to distil complex information about diverse factors which influence the productivity or structure of an economy.

⁵⁸ Morris 1999: xxviii-xxvix.

⁵⁹ Ibid.

⁶⁰ Morris 2002: 41.

⁶¹ Morris 2002: 42. Morris 2004.

⁶² Ober 2010: 243. Herodotus *Hist.* 7.102.1.

⁶³ Ober 2010: 245.

⁶⁴ Hirsch 2021: 21-22.

This complex web of factors can be categorised, and each organised category can be considered institutions. Simply put, ‘Institutions determine economic performance and economic performance determines institutions.’⁶⁵ Alston provides us with a map (fig. 1 in appendix p.74) which demonstrates the relationships of different institutions.

Alston’s diagram establishes the links between ‘informal institutions’ or the ‘norms of society’ and the ‘formal institutions’ or the ‘laws of society’.⁶⁶ It also contains the positions of government, technology, property rights and transaction costs, as well as their influence on economic performance.⁶⁷ Whilst this diagram is useful in understanding the basic connections made within NIE and how it can deepen our understanding of the economy, history, behaviour, or political development of a society, it remains a limited picture. For instance, Alston’s diagram demonstrates how ‘informal institutions’ influence ‘technology’ but it is unclear as to what constitutes an ‘informal’ structure.⁶⁸ Religion is a significant institution and could either be included in ‘informal institutions’ for its role in shaping cultural norms or as a ‘formal institution’ for its role in creating laws – especially if Alston’s framework is applied to a different historical period in which religion played a prominent legislative role.⁶⁹ Religion could even be included in Alston’s framework independently.

Oliver Williamson, on the other hand, has split these institutions into four levels of social analyses (fig. 2 in appendix p.75) - with a fifth ‘zero level’.⁷⁰ By using these levels, Williamson maps a hierarchical framework of institutions and notes the different types of analysis required to assess each level. For instance, level one, for Williamson, includes culturally embedded institutions such as Religion. He sees this as a non-economic institutional level, but one that impacts the economic level two, which includes the legislative bodies. For example, religious beliefs can impact laws and laws can hinder or foster economic growth. Williamson also hints towards a required further study of inter-level feedback. I will use this levelled analysis and develop Williamson’s suggestion of mapping feedback between these inter-institutional levels to create my own framework for the ancient world. The key characteristic of this will be my inclusion of the human-created environment at the zero level.

⁶⁵ Alston 2008: 2.

⁶⁶ Ibid.

⁶⁷ Ibid.

⁶⁸ Ibid.

⁶⁹ Ibid.

⁷⁰ Williamson 2000: 600.

NIE is a useful analytical tool for this task as it can be moulded to fit any period or society. My framework will be developed below following a discussion of how NIE has already been used in ancient history. I will then present Williamson's framework in full, alongside the modern critiques of his work, which I will consider when producing my framework.

2.4 New Institutional Economics in Ancient History

The shaping of modern NIE analysis is attributed to three significant scholars: Ronald Coase established the beginnings of Institutional Economics,⁷¹ Douglass North, tackled the idea of *New Institutional Economic History*, creating the 'rules of the game',⁷² and Oliver Williamson created a framework which can be amended for the analysis of any period of economic history.⁷³ Recently, scholars have developed and applied NIE analysis to their research areas to explain economic activity and explore the specificities of different institutions. The discipline of ancient history is no exception. Among the many ancient historians approaching this are: Alain Bresson (2007, 2008, 2016a), C. H. Lyttkens (2013), J. G. Manning (2020), Josiah Ober (2010, 2015), as well as Walter Scheidel, Ian Morris, and Richard Saller (2007). While it is not feasible to collate *all* instances of NIE scholarship in ancient history, I shall use the recent works of Bresson, Lyttkens, and Manning to take stock of the current explorations of NIE in ancient Greek history.

Alain Bresson's *The Making of the Ancient Greek Economy; Institutions, Markets, and Growth in the City-States* was first published in two volumes, in French, in 2007-2008 and subsequently revised, in English, in 2016.⁷⁴ The work is ambitious in its scope, outlining institutions and growth of the ancient Greek economies from the Bronze Age to the Archaic period through to the Hellenistic kingdoms. Bresson is clear that the theory of growth can be applied to the ancient Greek world and he draws on Ober to further argue that there was a measurable increase in productivity and economic growth in the Greek world.⁷⁵ Bresson begins with the idea that 'per capita growth, [in ancient Greece was] at a level unprecedented before the Early Modern period'.⁷⁶ By accepting ancient Greek economic growth Bresson is at odds with the 'orthodoxy' of ancient economics which he defines as Moses Finley (and the

⁷¹ Coase 1937.

⁷² North 1981.

⁷³ Williamson 1998 and 2000. Manning 2020: 27-28.

⁷⁴ I have used the revised English edition, thus, all references to the work will appear Bresson 2016a.

⁷⁵ Bresson 2016a: XXII draws on Ober 2010.

⁷⁶ Bresson 2016a: XXII.

subsequent Finleyan scholars) who, following Weberian and Marxist theorists, rejected the ideas of a growth-based and disembedded economy.⁷⁷ While Bresson acknowledges that ‘market institutions of ancient Greece were not those of contemporary industrial capitalism’ he nonetheless rejects the idea that the ancient Greek market ‘was a kind of formless, negligible appendix to a society of household production and consumption, reciprocity, or redistribution, as old orthodoxies claimed’.⁷⁸ Through this positioning, Bresson opens up the discussion, and, as other scholars have observed, ‘provides convincing new arguments’.⁷⁹ Yet, his work remains compatible with existing neoclassical economic scholarship which addresses subjects such as price fluctuation and profit maximisation.

One issue which arises from accepting profit maximisation, in both the modern and ancient economy, is the notion of *rational* economic decision making. An example Bresson provides is that ‘increasing available agricultural land always remained a rational objective for many small city-states’.⁸⁰ While this appears to be self-explanatory, the notion of ‘rationality’ invokes the theory of *homo economicus*. *Homo economicus* is the classical economic theory that a human economic actor acts in their best interest and is thus rational and predictable.⁸¹ However, Bresson notes that no economic actor, even *homo economicus*, has all the available information for economic decisions and is restricted by their institutional environment.⁸² It then becomes clear as to why Bresson begins his NIE analysis. NIE is particularly useful at overcoming the issue of rationality as even a free decision-making agent is subject to a hyper-specific socio-cultural background and is thus a product of their institutional environment.

Information asymmetry and transaction costs are also characteristics of a NIE analysis and further reject the idea that information is freely available to an economic actor.⁸³ Bresson explains this through the dichotomy between the institutions of marriage vs. business contracts. Both are institutional ways to minimise ‘chaos’ but are distinguishable in their purpose and social realms.⁸⁴ This is one of the key benefits of Bresson’s work as he is able to move

⁷⁷ Bresson 2016a: 110. See also Finley 1999. Bresson 2016b also argues against the ‘New Orthodoxy’.

⁷⁸ Bresson 2016a: 110.

⁷⁹ Ober 2017: 491: ‘Für lange geführte Kontroversen liefert es überzeugende neue Argumente.’ Bresson 2016a: 23 - ‘the propensity to maximize, which exists in every system, and without which there would be no production of goods and services at all, is a function of the incentives provided by rules for reproducing the social system’.

⁸⁰ Bresson 2016a: 418.

⁸¹ Bresson 2016a: 16.

⁸² Bresson 2016a: 23.

⁸³ Bresson 2016a: 250-254. Bresson 2016a: 19.

⁸⁴ Bresson 2016a: 19.

convincingly away from the past ‘binary... debates about nothing’ within ancient economic history.⁸⁵ Thus, Bresson is able to analyse how the institutions of the ancient world were able to operate and result in measurable economic growth in Greece. Furthermore, nuanced analysis wishing to take a NIE approach should also take into consideration the idea of expressive rationality put forward by Christesen (2003) which argues in favour of multiple rationalities in the Greek world that move beyond only *homo economicus* or *homo politicus*. David Lewis usefully builds on this in his discussion of bounded rationality.⁸⁶ Lewis specifically tackles Finley’s assumptions of the ancient world and analyses the shortcomings of Finley’s homogenisation of sources, selective omission of evidence, and generalisations of the Greek mindset.⁸⁷ Lewis’s work explains why institutions are essential for understanding the ancient Greek economy and how they can mitigate the issue of rationality.

Bresson draws on Williamson and suggests that NIE analysis is beneficial in its calculation of transaction costs as it represents a perspective from which we can analyse a series of ‘constrained choices, limited rationality and economic performance’.⁸⁸ Bresson suggests why NIE is appropriate for the study of the ancient world as it allows scholars to assess different types of cultural and economic evidence. Furthermore, NIE takes into consideration the limited rationality involved in economic decisions, with information asymmetry (that is unequal product information between a buyer and seller) and complex price fluctuations which are connected to not only information disequilibrium but also transaction costs.

Bresson’s work demonstrates how the institutions of the ancient Greek world impact its economy and how this develops; however, his framework is discussed without reference to whether hierarchies exist between the institutions in his sectors. He states ‘The institutions of a given society can be classified in four main sectors; the political (the state or other forms of collective authority), the symbolic (religion and other world views), the reproduction of persons (kinship and demography) and the production of material goods (economics)’.⁸⁹ While this is a clear overview of institutions, work should be undertaken to build on Bresson’s foundation in order to better understand the hierarchical relationships between these sectors. It

⁸⁵ Manning 2020: 5. Manning helpfully summarises these binaries as the ‘primitivism/ modernism, substantivism/ formalism, pessimists/ optimists, use-value/ exchange-value, status/ contract, rational/ irrational, *oikos/ polis*, private/ public, market/ non-market... debates about nothing.

⁸⁶ Lewis 2018: 26-28.

⁸⁷ Lewis 2018: 34-37.

⁸⁸ Bresson 2016a: 22-25.

⁸⁹ Bresson 2016a: 26.

also remains to be seen as to where other examples of institutions can be implemented into this framework. For instance, the environment or language could each be placed in multiple positions within his framework. Bresson notes that the aforementioned sectors ‘are constantly reverberating off each other’, but this raises the question of whether any single ‘sector’ has a larger impact on another.⁹⁰ Whilst this reverberation could be considered in Williamson’s terms inter-institutional ‘feedback’, it is still unclear as to where and how this feedback operates.⁹¹

The environment is a factor in the economic development of the Greek world, for Bresson, and it is *de facto* integrated into his NIE analysis, as one of the many ‘constrained choices’ that represents ‘limited rationality’ which can impact ‘economic performance’.⁹² The environment is representative of constrained choices through a manner of ways, from geography to climate variability to poor harvests (or bumper-crops which Bresson notes can paradoxically cause prices to crash and stunt growth).⁹³ However, rather than discuss the environment at a separate institutional level, such as Williamson’s ‘zero level’,⁹⁴ or as a factor which can influence non-economic institutions, such as religion or politics, Bresson instead prefers to focus on a *polis*-centric approach to purely economic institutions. For Bresson, the environment predominantly impacts the institution of demography and kinship ‘in the development of the environment, the number of people is an essential parameter’, he also suggests that ‘society becomes itself an element of the ecology of a region’.⁹⁵ This is useful as it notes the cyclical relationship between the ‘human-created’ environment and society; yet, it is limited by the inclusion of the environment within the institution of demography rather than isolating the human-created environment as an institution.⁹⁶ As Bresson is focussed on *polis* institutions and the development of the Greek economy it is difficult to criticise his approach. However, because the human-created environment is not considered separately as an institution, it is harder to trace its influence on non-economic institutions.

Bresson does not treat the environment separately as he believes that Greek prosperity has less to do with the environment itself but rather the economic institutional response to it. He argues that there is a ‘paradox’ between the Greek and the Mesopotamian/ Egyptian

⁹⁰ Bresson 2016a: 27.

⁹¹ Williamson 2000: 596.

⁹² Bresson 2016a: 22-25.

⁹³ Bresson 2016a: 432.

⁹⁴ Williamson 2000: 600.

⁹⁵ Bresson 2016a: 31.

⁹⁶ Merchant 2012: 1.

economic activity, which is not related to the ‘economic potential’ of the areas, in which the irrigated fields of Mesopotamia or Egypt resulted in higher yields.⁹⁷ Rather, the ‘allocation of goods’ within the ‘intermediary of the market’ was key to Greek economic growth.⁹⁸ Bresson is right to point out the paradox. The well-irrigated Mesopotamian land holdings meant Near Eastern farmers could reliably grow subsistence crops which the Greeks, especially in Attica, could not achieve on the same scale. Thus, Athens relied on imports. As Bresson argues, the difference is not that the Mesopotamian and Egyptian kingdoms simply taxed the private economic actors so highly that it was suffocating them, but rather that the Athenians were able to import the grain through faster and reliable sea trade and were thus less prone to famine.

However, sea trade was made possible by the human-created decision to focus resources on creating settlements in Ober’s Greek ‘ecological niche’.⁹⁹ This allowed private Greek economic actors, who, alongside from benefitting from much lower tax barriers, could grow cash crops such as olives and vines without heightening the fear of famine.¹⁰⁰ This meant that they did not have to compete with similar sized yields because a small yield of olives was still valuable. Furthermore, the market necessitated an increase in price for olive products (such as oil) because of its ability to be transported easily, whilst maintaining low transaction costs.¹⁰¹ I also argue that the value of the oil is relative, especially in Athens, to the non-economic institutions and religious significance of Athenian oil.¹⁰² Thus, some of the realised profit came from culturally embedded non-economic institutions which are themselves influenced by the environment. This is why I suggest that envisaging the human-created environment as an independent institution is useful as it allows for a deeper analysis of institutions and economic growth in ancient Athens.

Overall, Bresson’s work represents the most complete catalogue of the development of the ancient Greek economy through a NIE lens. Bresson successfully demonstrated how the *polis*, as an institutional structure, can be used to explain how the ancient Greek economy was

⁹⁷ Bresson 2016a: 103.

⁹⁸ Ibid.

⁹⁹ Ober 2015: 26.

¹⁰⁰ Bresson 2016a: 104. 16.6% tax is a recorded high for the Archaic period in Athens, which then becomes 8% in the Classical period – compared to the 50% tax percentage Bresson supplies for the non-Greek world. See also: Ober 2017: 491. ‘So reduzierte die marktbasierete Wirtschaft die Wahrscheinlichkeit ausgedehnter Hungerkrisen’ ‘Thus, the market-based economy reduced the likelihood of extended hunger crises’.

¹⁰¹ Bresson 2016a: 80 ‘The unit of transport cost is inversely proportional to the unit value per unit of weight and volume’ see also p.84 on amphorae transportation.

¹⁰² Papazarkadas 2011: 281. On religious value of attic Olives. Foxhall 2007: 94-95 mentions the added cultural ‘dimension’ to the value of oil.

able to witness unprecedented growth - comparable to the Dutch economy 'two millennia later'.¹⁰³ Despite its utility, Bresson's *polis* framework, as John Davies suggests, still 'need[s] expansion' in regard to market 'demand' and the *polis*.¹⁰⁴ Davies is correct to mention this desire for further expansion of some of Bresson's ideas, particularly in regard to how NIE can shape cultural demand for products. Moreover, I agree with his critique that: 'Non-*polis* entities within the Greek cultural orbit- monarchies, "federal" states, and (semi-)autonomous sanctuaries- barely appear save in walk-on roles' in Bresson's work.¹⁰⁵ Nevertheless, I feel that both critiques are harsh given the huge scope of Bresson's endeavour. Ultimately, as Ober rightly concludes, through his broad focus Bresson discusses the 'paradoxical relationship between politics and business' in a 'profound' and useful way.¹⁰⁶

Whilst Bresson focusses on the *polis* and mapping the development of the entire Greek economy, Carl H. Lyttkens's work, *Economic Analysis of Institutional Change in Ancient Greece; Politics, Taxation, and Rational Behaviour*, focusses on individual 'rational actors'.¹⁰⁷ Lyttkens's 'rational-actor perspective' is a useful approach that acknowledges incentive alignments; however, it relies heavily on the idea that 'economics is individualistic: an analysis of anything that takes place in society should ideally be based on a model of individual (instrumental [or causal]) behaviour.'¹⁰⁸ Although individuals' decisions are significant, and economic models should take this into consideration, the extent to which these individuals are a product of their institutional environment must be noted. I argue that wider institutional factors impact the economy more than isolated individuals. This is why NIE is a useful analytical tool as while the individual still has some form of autonomy, that autonomy is bounded within the environment, the social norms, the laws, the governance structures, and by the actor's own economic output and capital. Whilst I am hesitant to focus on the individual, as there is little individual data for the ancient world, Lyttkens nonetheless sees the 'rational-actor framework' as an explanatory model for the 'divergent developments' of 'individual incentives'.¹⁰⁹ He notes that this rationality is 'limited' and based on 'limited information and on their expectations and beliefs'.¹¹⁰ However, I would argue that there are more institutions,

¹⁰³ Bresson 2016a: 206.

¹⁰⁴ Davies 2017: 906.

¹⁰⁵ Ibid.

¹⁰⁶ Ober 2017: 490-492.

¹⁰⁷ Lyttkens 2013: 73.

¹⁰⁸ Lyttkens 2013: 73 for 'rational actor perspective' and p. 12 for 'individual behaviour'.

¹⁰⁹ Lyttkens 2013: 3.

¹¹⁰ Lyttkens 2013: 5.

including the human-created environment, which impact this rationality. Nevertheless, Lyttkens uses this ‘limited’ rationality to explain the ‘endeavour to maximise utility’.¹¹¹ This demonstrates how Lyttkens employs the ideas of growth and profit maximisation in Morris (2002, 2004) and Ober (2010).

Lyttkens assumes that ‘individuals... strive for power, wealth, and status.’¹¹² This is a valid assumption when analysing Athenian society with ‘incentive alignments’ being a key element of NIE analysis.¹¹³ This assumption can be connected to the idea of profit maximisation in the Greek world put forward by Morris in his article focussing on *kerdos*.¹¹⁴ I will assimilate Lyttkens’s and Morris’s ideas that profit was one motivation for economic growth in the ancient Greek world into my framework. However, I will be careful not to overemphasize the importance of the individual nor to equate this incentive alignment towards profit with rationality. This is because irrational economic decisions do not necessarily correlate with economic turmoil. For instance, one might take on significant financial stress to help a relative or a friend. *Xenia* is an example of a Greek institution which causes Glaucus and Diomedes to put down their arms in ‘irenic’ friendship in the *Iliad* (6.119-236).¹¹⁵ Whilst they stood to gain glory in battle, and perhaps economic gain, realising they shared *xenia* amongst their ancestors prevented them from continuing to fight. If we take Homer as didactic, it could be suggested that the maximisation of *xenia* was institutionally equal to, or greater than, ‘status’ or financial gain.¹¹⁶ Nevertheless, this can be integrated into NIE analysis. *Xenia* could be placed in a framework alongside the institution of charity, which Williamson places in his third level of institutional analysis, and this would allow us to see which institutions impact *xenia* whilst illuminating its economic implications.¹¹⁷ Whilst the institution of charity may be difficult to trace in the ancient world, financial donations or in-kind donations to sanctuaries may represent ideas beyond simply economic profit maximisation. Lyttkens is correct to suggest that individual ‘incentive alignments’ are key to unlocking a deeper understanding of Athenian economic activity, but we must be careful to not overstate the importance of individuals desire for power.¹¹⁸

¹¹¹ Lyttkens 2013: 5.

¹¹² Ibid.

¹¹³ Williamson 2000: 599.

¹¹⁴ Morris 2002.

¹¹⁵ For more see Harries 1993: 133.

¹¹⁶ Lyttkens 2013: 5

¹¹⁷ Williamson 2000: 599.

¹¹⁸ Ibid.

Lyttkens agrees with Bresson's *polis*-centric view of institutions suggesting that the 'comparatively modest rate of taxation' combined with farmers who 'control a substantial part of the agricultural surplus' allows for 'specialisation and growth'.¹¹⁹ For Lyttkens the *polis* emerges as a 'community of citizens, as a political, geographic, religious and judicial unit'.¹²⁰ This constitutes his framework of institutional influence over the *polis*. It is a practical overview of how institutions can impact the ancient economy. Alongside the important political, religious, and judicial elements, the inclusion of the geographic is pertinent to my case study. As a non-economic institution, the geography of a city is often glossed over, though Lyttkens does not neglect its institutional importance. However, as with Bresson, Lyttkens is not clear about how he envisages a hierarchy between these institutions. Williamson, as I demonstrate below, expresses different levels at which institutions influence each other. Williamson is clear that religious institutions influence the judicial which influences the political.¹²¹ Nevertheless, it remains unclear in Lyttkens's framework as to whether the community of citizens is more institutionally important than the geography and to what extent feedback occurs between all of his levels. I argue that these problems can be solved by accepting the zero level of Williamson's framework and using it to trace the human-created environment's significant influence on other institutions and *vice versa*.

J. G. Manning's work *The Open Sea: The Economic Life of the Ancient Mediterranean World from the Iron Age to the Rise of Rome* (2020) takes into consideration many of the fundamentals of NIE study. Manning's work fills some of the gaps in the work of his predecessors, such as Bresson, by focussing on the wider Mediterranean world. Manning builds a detailed picture of how the environment could affect the agricultural productivity of the Mediterranean. Manning notes how a study which attempts to incorporate the environment faces difficulties as the natural environment, the human environment, the 'state aims' and 'human responses' are complex, often at odds, but are nonetheless 'important'.¹²² Alongside the difficulty in assessing the 'aims' and 'responses' of humans, the environment also suffers from the complication of 'short' term effects and 'longer temporal scale' phenomena.¹²³ For example, rainfall, volcanic eruptions, and floods can each have miniscule or immense impacts

¹¹⁹ Lyttkens 2013: 34.

¹²⁰ Ibid.

¹²¹ Williamson 2000: 597.

¹²² Manning 2020: 77.

¹²³ Ibid.

on the ecology of a region.¹²⁴ While Manning notes the difficulty in including all of these elements in historical analysis, his work succeeds in furthering the NIE study of the wider Mediterranean.

Manning draws on the environmental historian William Cronon who suggested that ‘natural ecosystems... provid[e] the context’ for institutions; nevertheless, these ecosystems remain on ‘the margins of historical analysis’.¹²⁵ While Manning emphasises the ecosystem’s influence on what he calls ‘human institutions’ such as property rights, this is different from treating the human-created environment in a NIE framework.¹²⁶ In Manning’s formulation, the environment acts as a ‘context’ that disseminates into human institutions.¹²⁷ While the natural environment is this biological reality, I argue that the human-created environment, which includes human intervention, manipulation, or cultivation of the environment, can be categorised as an institution. By accepting this, it becomes easier to trace how human-created environmental phenomena have wider institutional impacts, such as the sanctification of *morai* which I discuss below, compared to simply an environmental institutional ‘context’ or ‘constraint’.¹²⁸

Nonetheless, Manning’s treatment of the environment demonstrates his priorities - which differ from Bresson who is more focussed on the *polis* as a fundamental institution through which all economic decisions are facilitated. Like Bresson, Manning discusses the environment within the context of human demographics; however, Manning assesses how the environment can create market demand in more detail.¹²⁹ Alongside human demographics, the animal population is crucial to Manning’s framework as it is essential ‘to get the correct model of grain/fodder crops’ for accurate institutional analysis.¹³⁰ This is a useful contribution to the ideas of institutions as it is easy to overlook the grain for non-human consumption despite its necessity. It demonstrates how the wider cultural aspects of meat eating, and perhaps even religious fasting, can impact the economic development. This topic was briefly discussed by

¹²⁴ Manning 2020: 77.

¹²⁵ Cronon 1983: vii quoted in Manning 2020: 143.

¹²⁶ Manning 2020: 210.

¹²⁷ Cronon 1983: vii quoted in Manning 2020: 143.

¹²⁸ Cronon 1983: vii quoted in Manning 2020: 143. Bresson 2016a: 22.

¹²⁹ Manning 2020: 176.

¹³⁰ Manning 2020: 177.

Bresson who reflects on religious fasting in early modern France which taxed fish during Lent – when it was consumed the most.¹³¹

Manning and Bresson also differ in their approach to the markets of Egypt and the Near East. Bresson is focused on the making of the *Greek* economy but does not relinquish outside influence on the Greek economy either. Nonetheless, Bresson does compare the *polis* and non-*polis* structure, determining that economic agents in the Near East and Egypt were at a disadvantage with their rulers ‘enjoying a monopoly’ on certain goods and with higher tax rates for the peasant economic actors.¹³² Bresson also suggests that Babylon and the ‘eastern world had local markets’ of ‘consumer goods necessary to feed the inhabitants’.¹³³ Manning, on the other hand, discusses how the ‘local markets’ of Babylon experienced market fluctuations and acute market activity.¹³⁴ Furthermore, he demonstrated that in the Near East ‘differential performance of markets’ can be analysed as well as ‘fluctuations of prices over time and within price regions’.¹³⁵ This shows the complexity of Near Eastern economies which leads Manning to suggest that we should note their influence when approaching any question surrounding the development of the Greek economy. This is pertinent given that Manning suggests that the interconnectedness of Mediterranean communities runs deeper than Horden and Purcell claim as their model is ‘missing’ ‘Egypt and southwest Asia’.¹³⁶ Thus, we can begin to see how the influence of other ancient societies play an important role in the formulation of Manning's idea of Greek NIE development.

Manning's NIE discussion of the development of the Greek economy is useful not only for this inclusion of a deeper level of interconnectedness with contemporary Mediterranean societies, but also for challenging the notion that the Near East lacked complexity – as evidenced by Bresson's ‘local market’ discussion above.¹³⁷ Perhaps the most interesting idea that Manning puts forward is the challenge ‘for ancient historians to build more complex social models’.¹³⁸ By building these more complex models, Manning hopes ‘that we will be better able to link climate variation to impacts on agricultural production and water resources.’¹³⁹

¹³¹ Bresson 2016a: 258.

¹³² Bresson 2016a: 103-104.

¹³³ Bresson 2016a: 102.

¹³⁴ Manning 2020: 230.

¹³⁵ *Ibid.*

¹³⁶ Manning 2020: 88.

¹³⁷ Manning 2020: 88. Bresson 2016a: 102-104.

¹³⁸ Manning 2020: 136.

¹³⁹ *Ibid.*

This is characteristic of his events-based approach, whereby he looks at volcanic activity to map Nile water level variation and thus retrospectively predicts the likelihood of famine or socioeconomic stress.¹⁴⁰ Manning calls for the ‘connection’ of economic and environmental history and to end the ‘relegat[ion] [of environmental history] to a casual, static description of major features’ briefly summarised in what he calls (quoting Burke) “a polite few paragraphs”.¹⁴¹ Manning furthers this claim by suggesting ‘environmental and economic history are two sides of the same coin’.¹⁴² All of this stresses the importance of that *Open Sea*. Here Manning is calling for NIE analysis which takes into consideration all the micro-environmental factors. Whilst the environmental history of Horden and Purcell is valuable for understanding the Mediterranean as a patchwork of microregions and interconnectedness, and ancient economists are beginning to understand how the economy of the Greek world developed and the culture that shaped it, Manning is calling for more nuanced study which combines these two factors. I believe that by drawing on the works of Manning and Bresson, plus other influential economic and environmental scholars, the future of NIE, ancient history, and the subsequent impact of the environment can be closely measured, discussed, and ultimately furthered.

To conclude, Bresson, Lyttkens, and Manning offer noteworthy NIE perspectives to be built upon. Bresson crafts a *polis*-centric approach and usefully shows the impacts of an institutional environment on the development of the Greek economy. Lyttkens’s approach is characterised by rational actors who make decisions either based on incentives or, in the case of Solon, to prevent ‘revolution’ or ‘tyranny’.¹⁴³ Manning focuses on a deeply interlinked analysis and brings the importance of international trade as well as the influence of contemporary civilisations on Greek society to the forefront. Manning also recognises the need for a more complex NIE framework which includes the environment, foreign trade, and socio-religious aspects. Lyttkens, however, perhaps draws too heavily on the ‘rational’ and ‘individualistic’ behaviour of economic actors.¹⁴⁴ This is something which Bresson, in his rejection of *homo economicus* has avoided as we cannot access the rationality of the ancient world.¹⁴⁵ I suggest we accept the ideas of Greek profit maximisation, as demonstrated by

¹⁴⁰ Manning 2020: 170-171.

¹⁴¹ Manning 2020: 143 quoting Burke in Burke and Pomeranz 2009: XI.

¹⁴² Manning 2020: 143.

¹⁴³ Lyttkens 2013: 72.

¹⁴⁴ Lyttkens 2013: 12.

¹⁴⁵ Bresson 2016a: 16.

Morris, but that we do not equate this with pure rationality.¹⁴⁶ Following Manning, I agree the aim of future investigation should be to develop more complex NIE models which demonstrate the influence of non-Greek societies and the environment on Greek institutions.

Overall, this establishes the application of NIE theories in ancient Greek history as a rich foundation of work, but one that still requires development. I argue that the frameworks suggested by Bresson, Lyttkens, and Manning, do not treat the environment, human-created or otherwise, as a separate institution nor do they show the hierarchical relationship between the environment and other institutions. As such, I will turn to the work of Oliver Williamson whose framework for NIE study can be developed to include the environment and express the relationship between different institutional levels and add to our understanding of the ancient world.

2.5 Williamson

Oliver Williamson is an economist who developed a framework for modern NIE study. He advanced the work of Ronald Coase, who developed the idea of ‘the firm’, as well as Douglass North, who defined ‘the rules of the game’.¹⁴⁷ These rules are the established behaviours and beliefs which structure human thought and thus bring about economic action (or the play of the game). In his framework, both non-economic and economic institutions add up to an impressive house of cards which can be seen as a structure for an economy. These economies can vary from society to society and thus one framework should not rule all. However, whilst the rules and the play of the game are significant factors of NIE analysis, which influence economic activity, it is also true to continue the analogy, that the playing field, the environment, influences the game.

This playing field is what Williamson tentatively refers to as the ‘zero level’ of institutional analysis.¹⁴⁸ I will summarise Williamson’s main thesis, looking at the state of NIE, and explain his framework. In turn, I will look at this important ‘zero level’ and from there I will move on to the main criticisms of Williamson’s work.¹⁴⁹ This will allow me to build upon the work of Williamson to propose my own framework, which can then be applied to the

¹⁴⁶ Morris 2002.

¹⁴⁷ Coase 1937. North 1991: 97.

¹⁴⁸ Williamson 2000: 600.

¹⁴⁹ Ibid.

ancient world. This framework will be limited to the ancient Greek world and thus only useful in specialised analysis. However, I aim to demonstrate that other frameworks can be built so more societies, over different time periods, can be measured and analysed to witness changes in economic performance and the impact on government and social structures.

2.5.1 Williamson's Framework

Williamson's 2000 work 'The New Institutional Economics: Taking Stock, Looking Ahead' expands the initial ideas covered in his 1998 article 'The Institutions of Governance'. Williamson begins by discussing the fact that 'chief among the causes of ignorance' within the discipline of economics is the simple fact that 'institutions are very complex' and have thus been neglected.¹⁵⁰ This complexity has resulted in neoclassical economics being 'dismissive of institutions' and of the 'scientific ambitions' of NIE scholars.¹⁵¹ However, Williamson suggests that institutions are not only important but they are 'susceptible' to economic analysis.¹⁵² Williamson draws on Arrow's discussion of the differences between neoclassical economics and NIE. Arrow suggests that NIE does not necessarily aim to give 'new answers to the traditional questions of economics' regarding 'resource allocation and the degree of utilisation' instead NIE answers 'new questions' such as 'why economic institutions emerged the way they did'.¹⁵³ NIE has progressed since 2000, and there are now ways in which NIE can answer some of the traditional questions of economics, particularly in behavioural economics and *homo economicus*, which I have discussed above. Nonetheless, Williamson's complex framework of how institutions interact remains relevant and I will build on his work to create my own framework which is applicable to the ancient world.

Williamson outlines his NIE framework (fig. 2 in appendix p.75) and what he calls the 'four levels of social analysis'.¹⁵⁴ Williamson prefaces this structure by stating that the higher levels 'impose constraints' on the levels below, yet, this influence can experience 'signal feedback'.¹⁵⁵ For the purpose of his work, Williamson acknowledges this 'system is fully interconnected', yet he simultaneously chooses to 'neglect these feedbacks' as they are not relevant to a general framework.¹⁵⁶ This is an understandable omission as feedback is

¹⁵⁰ Williamson 2000: 595.

¹⁵¹ Ibid.

¹⁵² Ibid.

¹⁵³ Arrow 1987: 734 quoted in Williamson 2000: 596.

¹⁵⁴ Williamson 2000: 596.

¹⁵⁵ Ibid.

¹⁵⁶ Ibid.

dependent on the society and economy being analysed and thus cannot be generalised. However, I will be sure to include feedback within my own framework because, as Williamson suggests, NIE has been ‘concerned principally with levels two and three’ rather than the entire institutional framework and its relationships.¹⁵⁷

Williamson summarises each level thus: level one is the social theory, level two denotes the economics of property rights and ‘positive political theory’, level three is transaction cost economics, and level four is neoclassical economics or agency theory.¹⁵⁸ This is useful, as not only does Williamson clearly set out where he believes the institutions lie, but also establishes a hierarchy of these levels. Alongside this hierarchy, Williamson also posits the ‘frequency’ of change in these levels which to some extent necessitates or justifies their place in the hierarchy.¹⁵⁹ Religion, for instance, remains relatively constant for millennia and can impact laws which last for centuries; meanwhile, political leadership can change every four years. The final level, neoclassical economics, is continuous throughout time as there are always producers and consumers; however, they are still influenced by the other levels. The applicability of Williamson’s framework to other non-modern historical periods must be questioned. For instance, frequency of change is one aspect where Williamson has been criticised in modern literature.¹⁶⁰ Since 2000, technological developments have altered institutional frequency and this should be acknowledged by studies which utilise his framework. Whilst I will deal with these criticisms in more detail below, I believe that Williamson’s work is representative of the time in which he was writing; nevertheless, it remains useful. That is providing the frequency is either justified for the time period being analysed, or that a new frequency (or lack thereof) is proposed.

For Williamson, level one is valuable as it allows for the ‘identification and explication of the mechanisms through which informal institutions arise and are maintained’.¹⁶¹ He draws on the economic sociologists Smelser and Swedberg who observed the four different kinds of ‘embeddedness’: ‘cognitive, cultural, structural, and political’.¹⁶² Williamson argues that there should be some distinction between these types of embeddedness and that future scholarship

¹⁵⁷ Williamson 2000: 596.

¹⁵⁸ Williamson 2000: 598.

¹⁵⁹ Williamson 2000: 597.

¹⁶⁰ Fresco et al. 2021.

¹⁶¹ Williamson 2000: 597.

¹⁶² Smelser and Swedberg 1994: 18 quoted in Williamson 2000: 597.

should take note of this.¹⁶³ Williamson furthers this discussion by stating that he believes that the creation of these informal level one institutions are ‘spontaneous’ and that ‘deliberative choice of calculative kind is minimally implicated’.¹⁶⁴ Whilst Williamson is right to suggest that many traditions and norms throughout history are spontaneous, I posit that deliberative choices and calculated decisions play a more than minimal role. Many traditions and morals are developed over time, in relation to science, nature, or common sense. There is more than a spontaneous link between Christmas and the winter solstice.¹⁶⁵ Whilst Williamson perhaps underplays the role that conscious actions had on the developments of level one institutions, he nonetheless acknowledges the ‘lasting grip’ they have on society.¹⁶⁶

Level two for Williamson is what North called the ‘formal rules’ of a society – their ‘constitutions, laws, [and] property rights’.¹⁶⁷ This is where the society, which is unified by their level one conditions, chooses their forms of governance, what laws they will abide by, and importantly the decision to protect or to neglect property rights. Once property rights are established, then an economy can fully operate, as without being able to *own* anything, it is not possible to *buy* something. It is the ideas of property rights that underpin many transactions. Once someone can own a piece of land, there must be a law protecting their ownership of said land, and a third party that would protect that land from theft - or a legal process to dispute ownership of that land. This necessitates contractual agreements, and thus bureaucracy to ensure that these contracts are kept, recorded, and enforced. As Williamson says, it is the ‘definition and enforcement of property rights and contract laws’ which are the most significant, and that it would take a drastic change of the status quo e.g. ‘civil wars’, ‘occupation’, ‘perceived threats’, and ‘military coups’ to disrupt these established rules.¹⁶⁸ It is the immediate threat of a disrupting event which opens up ‘rare windows of opportunity to effect broad reform’.¹⁶⁹ This relates to the political insatiability, or *dysnomia*, that preceded Solon's archonship which is discussed below.

Williamson also notes the connections between first order economising, Positive Political Theory (PPT), and the second level. By first order economising, Williamson is

¹⁶³ Williamson 2000: 597.

¹⁶⁴ Ibid.

¹⁶⁵ The winter solstice was a pre-existing pagan holiday based on the natural phenomenon of the shortest day.

¹⁶⁶ Williamson 2000: 597.

¹⁶⁷ North 1991: 97.

¹⁶⁸ Williamson 2000: 598.

¹⁶⁹ Ibid.

referring to the point at which most economists have built the first set of economic decisions (e.g., laws) which can affect economic performance. Whilst Williamson sees value in PPT, he retains the position that NIE improves our understanding of not only these first order economising decisions, but also the social environment which produces them. Continuing this discussion of the benefits of PPT, Williamson draws on Coase who stated that with the definition of property rights: ‘Chaos disappears; and so does the government except... to arbitrate disputes’.¹⁷⁰ Williamson agrees with Coase stating that following the establishment of property rights ‘the government steps aside’.¹⁷¹ However, this claim is not useful for historical analysis. Whilst I discuss my criticisms of Williamson in more detail below, the suggestion that the government is *supposed* to step aside and let ‘the marvel of the market work its wonders’ cannot be applied to the ancient world.¹⁷² The utility of this idea is limited to the analysis of a modern, free market, capitalist economy and thus I shall not endorse this notion in my NIE framework for the ancient Greek world.

Level three for Williamson includes the institutions necessary for the governance of firms in action. If level two is about the ‘formal rules’ of the game, then level three concerns the play of the game.¹⁷³ It is within this level that transaction costs are situated and as Williamson rightly expounds ‘costless court orderings [exist only in] fiction’.¹⁷⁴ Not only does level three include these transaction costs for Williamson but also firms and how they are run. Williamson draws on J. R. Commons who suggested transactions ‘contain... the three principles of conflict, mutuality, and order’.¹⁷⁵ The subsequent costs involved with resolving these conflicts are transaction costs. Many examples of transactions, and institutions which facilitate them, can be found in the ancient Greek economy. For instance, the *agora* lowers transaction costs by increasing the trust of economic actors.¹⁷⁶ Thus, the ‘governance’ of the parties involved in a given transaction, ‘is an effort to craft *order* thereby to mitigate *conflict* and realise *mutual gain*’.¹⁷⁷ What Williamson is discussing here are the multiple institutional conditions which must align for transactions to take place. A form of order which allows for a

¹⁷⁰ Coase 1959: 12.

¹⁷¹ Williamson 2000: 598.

¹⁷² Ibid.

¹⁷³ North 1991: 97.

¹⁷⁴ Williamson 2000: 599.

¹⁷⁵ Commons 1932: 4.

¹⁷⁶ Bresson 2016a: 234-236. p.235 Bresson draws on a law recorded in Demosthenes *Against Leptines* 20.9 ‘a law prescribes that it is forbidden to deceive in the Agora’.

¹⁷⁷ Williamson 2000: 599 My emphasis.

transaction to occur must be instituted. Conflict must therefore be put aside in lieu of negotiation and mutual gain can explain the reason for the transaction itself.

This transaction cost and governance approach aims to move past the ideas of agency theory which looks at ‘ex ante incentive alignments’ between those who hold agency within a firm.¹⁷⁸ Agency is important in modern NIE study as the shareholders of a company may have different incentives, such as dividend payments, compared to executives who may look to reinvest profits into the business. Thus, Williamson suggests that NIE focusses on ‘ex post stage of contract’ based analysis. To do this Williamson outlines four strategies: (1) ‘name and explicate’ ways in which transactions differ in their needs, (2) ‘name and explicate the principle attributes for describing governance’ e.g., ‘markets, hybrids, firms, regulation, bureaus, non-profits’ and how they differ, (3) determine ‘which transactions are aligned with governance structures’, and (4) evaluate whether these ‘alignments are corroborated by the data’.¹⁷⁹ This moves away from Coase’s (1937) issue of ‘vertical integration’ because ‘any issue that arises as or can be reformulated as a contracting issue can be examined’ through ‘transaction cost economising terms’.¹⁸⁰ This is a complex level of analysis within Williamson’s overall framework. However, by taking some of the basic principles of Williamson’s discussion of transaction costs, it can be conveniently applied to a variety of analyses.

All this culminates in what Williamson calls ‘second order economising’.¹⁸¹ This is where the economic actors make sure the ‘governance structures are right’ to improve efficiency, either within a specific firm or within a production/ shipping process.¹⁸² If the structures for economic activity are right, then they are orientated towards lowering transaction costs, therefore they are more efficient and productive. In Williamson’s modern framework this governance of firms is ‘re-examined periodically’ between every ‘year to a decade’.¹⁸³ This is unlikely to be applicable to my model of the ancient world, especially given that many of the transaction costs in the ancient Greek economy related to shipping and the environment. In a modern firm, contracts can be renegotiated within a short timeframe because different trade routes, updated shipping information, or more accurate naval data are easily accessible.

¹⁷⁸ Compare this to Lyttkens 2013: 12 regarding his discussion of incentives.

¹⁷⁹ Williamson 2000: 599.

¹⁸⁰ Ibid.

¹⁸¹ Williamson 2000: 599.

¹⁸² Williamson 2000: 597.

¹⁸³ Williamson 2000: 599.

Although in the ancient world, merchants' contracts for the import or export of a product, or a change in the planned trade route, could not have occurred at this speed.¹⁸⁴ Despite this, there were elements of ancient transport institutions which did reduce transaction costs, such as the standardisation of amphorae, amphorae stamps designating origin or ownership, and the development of reliable shipping techniques.¹⁸⁵

Level four is the final level which Williamson discusses in detail within his framework and it is the 'level at which neoclassical analysis works'.¹⁸⁶ In other words, level four contains all the orthodoxies of market analysis, supply and demand, labour, and price adjustment. As a result, level four witnesses the most institutional feedback from the influence of the preceding levels which underpin the conditions for market analysis. Once each preceding level has been properly discussed and analysed, this framework can demonstrate why and how an economy functions. For instance, we must first understand how a society operates and what governance structures exist, both in business and in government itself, before we can analyse price fluctuation and market demand. This level thus relies on both extensive analysis of the preceding levels and on neoclassical economic tools.

Before concluding the discussion, Williamson posits the idea of a 'zero level' of economic and social analysis.¹⁸⁷ This is influenced by the work of Steven Pinker (1997) and leads Williamson to suggest economic analysis should include the 'evolutionary level in which the mechanisms of the mind take shape'.¹⁸⁸ The zero level is a useful proposition as it allows scholars to undertake a more in-depth analysis of the deepest level of embedded institutions. I argue, in my own framework, that it is at this level where the 'human-created' environment can be situated as an institution.¹⁸⁹ The natural environment is profoundly important in the evolution of our species and our minds and it is the biological reality in which all economic action takes place. However, it is the human-created environment which can be considered an institution as it demonstrates the deliberate choices of societies and how they alter and inhabit the environment. Following my discussion of the critiques of Williamson's work, I shall build my framework aiming to demonstrate the utility in integrating the environment into a NIE

¹⁸⁴ Bresson 2016a: 304. The Athenians even provided costly 'escort' ships to ensure their grain imports arrived safely which requires more organisation and time than modern shipping allows for.

¹⁸⁵ Bresson 2016a: 126, 243.

¹⁸⁶ Williamson 2000: 600.

¹⁸⁷ Williamson 2000: 600.

¹⁸⁸ Ibid.

¹⁸⁹ Merchant 2012: 1.

framework which can help us understand the institutional development of the ancient Athenian economy.

2.5.2 Critique of Williamson

Whilst this is not a review of Williamson's work, it is necessary to engage with the criticism of his ideas and identify where his framework may vary from one I would build for the ancient world. This overview will look at three main points: firstly, I will address Williamson's lack of environmental acknowledgement, secondly, I will discuss the validity of Williamson's frequency (timeframes) for institutions, and lastly, I will discuss the governmental absenteeism and free market in his framework and how these do not apply to the ancient world.

The first issue with Williamson's framework is its lack of environmental data, natural or human-created, as a factor that influences institutions. This is likely due to the fact he was taking stock of previous NIE approaches and previous work has not fully considered the environment as an influence on institutions. However, the environment affects people's lives in several ways and I argue this can be seen in both non-economic and economic institutions. Moreover, Williamson discusses the zero level of his institutional analysis; yet, he is hesitant to implement it. In my opinion, this is a missed opportunity for him to integrate the human-created environment in at an institutional level. This integration would allow us to see the extent to which the environment affects institutions - beginning from the deeply embedded social and religious realms, to supply, demand, yield, distribution, and transaction costs. In the ancient world, the Greek economy would not have developed in the way in which it did without the Greek mastery of the '*corrupting sea*'.¹⁹⁰ *Poleis* with ports had more opportunity for economic activity, given that maritime transport cost 'far less' than over land transport, where duties would be paid passing through each area, rather than on entering/leaving a port.¹⁹¹ Furthermore, *poleis* may have even resorted to war to gain direct access to the sea as the benefits from the controlling a port were so high.¹⁹² These ports meant that *poleis* could collect 'customs duties on goods entering or leaving the territory' simultaneously allowing them to limit tax evasion and monitor production and commerce.¹⁹³

¹⁹⁰ Title of Horden and Purcell 2000 quoted in Bresson 2016a: 293.

¹⁹¹ Bresson 2016a: 293.

¹⁹² Bresson 2016a: 298.

¹⁹³ Bresson 2016a: 294.

However, the sea is just one aspect of the environment which influences the ancient Greek economy. In my case study, below, I use the example of the olive to trace this wide ranging influence. The olive will allow me to delve deeper into the ways in which the environment impacts economic and non-economic institutions alike. Situating the human-created environment in the zero level is the basis for building on the work of Williamson and, in combination with the work of other ancient historians, I will form my NIE framework for the ancient world.

My second criticism, as I discussed above, lies in Williamson's use of 'frequencies' for institutions.¹⁹⁴ Frequency, for Williamson, is the timeframe over which these institutions change and he uses the longer timeframes of religion to justify its hierarchy over legal or political institutions. His periodisation is, however, often arbitrary. For instance, Williamson states that religion changes over a period of 100-1000 years.¹⁹⁵ This is not clear, as each religion is different, and this estimate seems randomly attributed to a modern context. I will not include frequencies for institutional change in my framework as it is not applicable to the ancient world. It has been argued by modern proponents of Williamson that this frequency is still unable to cope with the modern world.¹⁹⁶ Even in the quarter of a century since Williamson published the article the economic and political world has drastically changed. NIE is suited to deal with this change and new institutions, such as the internet and modern technological communication systems, can be incorporated as peripheries to transaction cost economics and information asymmetry. This ties in with the discussion of information and communication technology and Williamson's timeframe in Fresco et al.¹⁹⁷ Nevertheless, Williamson's framework is applicable to the context in which he was writing despite not mapping perfectly onto a contemporary or historical approach. Ultimately, his framework is still used in modern studies, notably Bradley et al. use many aspects of his work in their table of micro and macro-economic policies on the institutional environment.¹⁹⁸ Bradley et al. and Fresco et al. both demonstrate that Williamson's framework is useful, yet it requires nuance, I consider this in my framework, below, which is applicable to the ancient Greek world.

¹⁹⁴ Williamson 2000: 597.

¹⁹⁵ Ibid.

¹⁹⁶ Fresco et al. 2021: 709.

¹⁹⁷ Ibid.

¹⁹⁸ Bradley et al. 2021: 171-72.

Finally, I disagree with Williamson's suggestion (in the second level) that the government should disappear once it has institutionalised and enforced property rights only to reappear when necessary. Williamson is drawing on Coase and, therefore this discussion of governmental absenteeism is not strictly his own; however, nuance is required – especially when studying the ancient world where an existence of a free market is debated.¹⁹⁹ For example, as Bresson describes, merchants in the Athenian *agora* could consult a *dokimastes*, a *polis*-representative coin inspector, to judge the quality of the coinage which was offered as payment.²⁰⁰ If the inspector deemed it lower quality it was seized. If it was passed by the *dokimastes*, the merchant *had* to accept the payment – or forfeit their stock for state auction. In this manner, we see an institutional requirement for local government involvement even in free transactions in the public sphere, thus, dispelling any suggestions that the *agora* was a free market. Moreover, the ancient economy would not be capable of Williamson's suggestion to let 'the marvel of the market work its wonders' because so much economic activity was controlled by the *polis*.²⁰¹ Furthermore, in the ancient Athenian economy tax was dependent on citizenship and status which was defined by the city-state. This shows another element of government intervention beyond the establishment and enforcement of property rights.

The issue of inflation is key in the discussion of governmental or state intervention in the economy. While it is unlikely that the ancient *poleis* were intimately connected to the ideas and causes of inflation, Bresson demonstrates that money 'itself' has an impact on 'economic development', suggesting that the Athenians 'enjoyed the advantage of having silver deposits in Laurion at [their] disposal'.²⁰² This phenomenon was largely positive and 'the growth of Attic coinage triggered... production and trade, and thus economic growth [across the] Mediterranean world'.²⁰³ Additionally, this demonstrates that the ability to mint coinage was innately connected with the natural world and with the efficiency of the institutions required to mint coinage. The Athenian 'state' owned the mines at Laurion, and thus profited from private citizens who leased the mines, in turn, these citizens profited by ensuring the monetisation of the silver, either through foreign exports or minting.²⁰⁴ In the 'closed-currency system' of

¹⁹⁹ Soll 2022 writes about the history of the free market, and suggests it was a very limited phenomenon in the ancient world.

²⁰⁰ Bresson 2016a: 271-272.

²⁰¹ Williamson 2000: 598. See my discussion of ancient laws which control economic activity below including: Demosthenes 34.36-37; 35.50-51, Lysias 22.5-6, and [Aristotle] *Ath. Pol.* LI.3-4.

²⁰² Bresson 2016a: 277.

²⁰³ Bresson 2016a: 278.

²⁰⁴ Bresson 2016a: 274-275.

Athens, not only did the availability of money have a determining effect on the value of the coinage, but it also meant that smaller cities trading with Athenian minted drachmas helped increase the value of Athenian coinage.²⁰⁵ Over time, this resulted in the rise of the value of silver coins relative to gold from 13.3:1 in the fifth century to 10:1 in the fourth.²⁰⁶ In the contemporary world, inflation is more of a concern and must be managed by a non-commercial body e.g., a government or state bank. Yet, this does not negate the existence of inflation or value fluctuation of coinage in the ancient world, nor does it prove that the ancient world did not require state intervention.

2.6 My Framework

I have outlined Williamson's framework for NIE analysis which places institutions into a hierarchy of levels. The mapping of this inter-institutional influence has caused me to re-evaluate my thoughts surrounding the development of both ancient and modern economies. As such I am proposing my own framework that is applicable to the ancient Greek world; which not only builds on Williamson's levels but one that explicitly furthers his idea of a zero level and places the environment within it. This allows me to answer how the environment can be integrated into NIE analysis and what this can tell us about the development of the ancient Athenian institutions.

The ancient world differs from the modern in many ways. The Athenian *polis* was not a secular state, it institutionalised and profited from slavery, and subsistence living and self-sufficiency were more pertinent issues. In the economic realm, Athenian institutions including the *agora*, the *emporion*, and the *deigma*, varied drastically from those of the modern world. Whilst classical Athenian institutions such as market supervisors (*agoranomoi*, *astunomoi*) may find modern (though not exact) parallels in magistrates and policemen, *sitonai*, *sitophulakai* and *sitopolai* public grain wardens, buyers and sellers, are not easily comparable to today's institutional environment.²⁰⁷ Nevertheless, the functions of the *sitonai* and *sitophulakai* i.e., the subsidisation of public food as well as the limiting of price scalping and profiteering from basic essentials, are in place in today's system albeit at a governmental level. While there are similarities between the ancient and modern world, a new framework must be drafted to analyse ancient institutions.

²⁰⁵ Bresson 2016a: 274-275.

²⁰⁶ Bresson 2016a: 275.

²⁰⁷ Bresson 2016a: 334-335.

My framework (fig. 3 in appendix p.76) begins with the zero level to emphasise the influence of the environment on the subsequent institutions in levels one to four. Williamson's zero level includes human psychological development but I argue that both language and the human-created environment can be included here as institutions. The natural world, including the natural events that Manning discusses, influences the human-created environment, as well as psychological development and language.²⁰⁸ However, the natural world does not constitute an independent institution as institutions are organised by people. The human-created environment, on the other hand, can be considered an institution as it represents the intersection of human behaviour and the environment. For instance, the development of the idiosyncratic Greek 'ecological niche', which *poleis* favoured, can be considered a human-created environmental phenomenon.²⁰⁹ I also removed modern institutions such as a free self-regulating market from Williamson's schema and added ancient Greek institutions such as slavery, thus, making the framework applicable to the ancient world. I have chosen to remove 'frequency' from the framework as it is not useful when applied to periods other than the context in which Williamson was writing.²¹⁰

My framework (fig. 3 in appendix p. 76) introduces some key changes to Williamson's schema. For instance, I have formalised the importance of the zero level to include: the human-created environment, psychological development, and language. This level is pertinent to my thesis, as it allows me to argue for the placement of the environment in a NIE framework and demonstrates its impact on subsequent institutional levels. I have also included sanctuaries at level one as they are important within Greek religion. In the second level, I have added the institution of the *polis* as it dictates the elements of the institutional environment that Williamson mentions, i.e., the judiciary and bureaucracy.²¹¹ The *polis* also upholds the institutions of citizenship and slavery which I have chosen to include here. Coinage could either be seen as a level two or level three institution. This depends on whether we consider the minting of coinage, which was overseen by the *polis*, as an element of *polis* bureaucracy or whether we see coinage's role in the reduction of transaction costs as a level three phenomenon. There is a significant amount of institutional feedback when it comes to coinage which makes it difficult to place; nevertheless, I place coinage in level two. The third level includes *polis*

²⁰⁸ Manning 2020: 170-171.

²⁰⁹ Ober 2015: 26.

²¹⁰ Williamson 2000: 597. Fresco et al. 2021: 709.

²¹¹ Lewis 2018: 40 also includes *polis* institutions as a level two phenomena.

institutions which monitor economic or governance activity. This includes the assembly, the *agoranomoi* and *astunomoi* as well as the *sitonai*, *sitophulakai* and *sitopolai*. The third level also pertains to transaction costs. The fourth level includes neo-classical market analysis. Here, I have added the *agora* and the *emporion* to Williamson's framework as idiosyncratic Greek institutions.

My framework is also cyclical. Whilst there is an inherent hierarchy, with influence beginning in the zero level and disseminating down to level four, later levels also influence the preceding ones. Level four, as we see in both the modern and ancient era, influences the zero level. Supply and demand can affect the human-created environment as people choose different types of wheat, varieties of grape, or olives to cultivate. Moreover, shipping routes associated with transaction costs, in level three, may be more valuable to consumers because of a product's attribute, such as the high-quality reputation of Thasian wine described by Bresson, in level four.²¹² To further this example, *poleis* neighbouring Thasos may have reduced their focus on viticulture and instead focused on wheat or animal husbandry; this represents human-created changes to the environment at the zero level. Equally, variations in the climate may be unpredictable and decrease Thasian grape yields. This could be seen as a religious matter and vine-owners might choose to sacrifice to the gods, in the sanctuaries of level one, which could see profit for sanctuaries and the *polis*. Unpredictable environmental factors could increase religious practise, leading to the establishment of a festival in level three governance, which could increase merchant traffic and thus have a level four economic result. All of this demonstrates how human-created and natural environmental factors can have exponential ramifications on the development of institutions.

Based on this framework, I intend to demonstrate the role of the environment in the ancient Greek economy, through one of its manifestations – the olive. I propose that by tracing the importance of the olive, within Greek and Athenian culture, we will begin to see both its economic and non-economic institutional importance. This impact will demonstrate how the zero level institution of the human-created environment is significant to every subsequent analytical level. In my case study, I use my NIE framework to note the connection between the human-created environment and the religious and cultural aspects of Athens's relationship with the olive. This will aid our understanding of Athenian institutions by fully considering the role

²¹² Bresson 2016a: 126.

of the human-created environment within a NIE framework. The olive is representative of this human-created environment and can be connected to Athenian institutions, including the reforms of Solon and legislation recorded in Lysias 7.

3. Case Study

3.1 The Olive

This case study examines how Athenian institutions were influenced by the human-created environment, which is situated in the ‘zero level’ of my NIE framework.²¹³ I will demonstrate this influence by tracing the olive through both economic and non-economic Athenian institutions. The olive grows in the Attic environment due to the natural qualities of its geography and soil conditions; however, the cultivation of the olive became an integral part of the human-created Athenian environment from circa. 3,750 BCE onwards.²¹⁴ The strong presence of the olive in Athenian material and literary culture lends itself to this type of analysis due to the olive’s significance in the Athenian naming myth,²¹⁵ the legal dispute recorded in Lysias,²¹⁶ and the laws of Solon,²¹⁷ which cross religious, legal, and governance institutions. In this case study, I will focus on the *polis* of Athens, and the surrounding agricultural region of Attica, from the Archaic to the Classical period. I begin with archaic Athens because the settlement patterns, at the start of the seventh century BCE, indicate that there was a systematic clearing of private domestic properties from the area of the *agora*.²¹⁸ It is at this point we can perhaps suggest that a ‘politically unified Attica’ began to emerge because a public space for ‘civic, religious, and social activities’ was created.²¹⁹ These activities included the celebration of the Panathenaic *agones*.²²⁰

²¹³ Williamson 2000: 600.

²¹⁴ Kyrikou et. al 2020: 33-34.

²¹⁵ Herodotus *Hist.* 8.55. also referred to as the ‘contest myth’ in Papazarkadas 2011: 261, 281.

²¹⁶ Lysias 7 *Before the Areopagus: The Matter of the Olive-Stump*.

²¹⁷ There are many sources including [Aristotle’s] *Ath. Pol.* Plutarch’s *Life of Solon*, and Diogenes Laertius’ *Lives of Eminent Philosophers*.

²¹⁸ D’Onofrio 1997: 67.

²¹⁹ D’Onofrio 1997: 67-68. Furthermore, D’Onofrio 1997: 68 suggested that it was at this time that ‘the Athenian aristocracy established the basis of the political and social organisation of the city-state and that this historical process affected its topographical organisation.’ There is also more recent work which demonstrates the importance in rethinking archaic Athens through archaeological evidence, which looks at the changes which took place in Athenian life including funerary variability and social complexity. For more see: D’Onofrio 2019, Doronzio 2019, and Graml, Doronzio and Capozzoli 2019.

²²⁰ D’Onofrio 1997: 67-68.

The geography of Attica is ‘well suited for olive production’ and cultivation,²²¹ and the olive has been a ubiquitous feature of the Attic environment for millennia. In the Archaic and Classical periods examined in this thesis, the olive constituted part of the Athenian diet at every stratum of society. Furthermore, with widespread oil production, olive oil became an everyday necessity as fuel for lamps and a luxury used in perfume and gymnasium oil.²²² In the culinary sphere oil was used as an *opson* or a ‘seasoning, condiment, [or] relish’ to enhance the flavour of common foods.²²³ Foxhall notes its importance in ‘elegant’ or luxury cooking suggesting that ‘white oil’ was the best.²²⁴ This ubiquity, across the common and luxury market, is linked to the reputation of Athenian oil derived from the sanctification of *morai*, sacred olive trees, from which the Panathenaic victors’ oil was made.²²⁵ Lin Foxhall’s book *Olive Cultivation in Ancient Greece: Seeking the Ancient Economy* (2007) is useful for understanding how olive cultivation can be viewed from an economic perspective. Foxhall’s focus, however, encompasses the entire Greek world and crosses a larger timescale than that which I intend to cover.

One difficulty that this thesis will have to overcome is the lack of material evidence in Athens demonstrating the large-scale production of oil when compared to Olynthos and Klazomenai. In the archaeological record, we have grinding stones and *trapeta* from both Olynthos and Klazomenai which prove the existence of large-scale oil production and specialisation. In contrast, Athens provides no such archaeological remains.²²⁶ Nevertheless, there is literary evidence to support the existence of oil production in Athens. The *Athenian Constitution* records that the state levied three-quarters of a pint of olive oil per trunk from *morai* across the city in the fourth century.²²⁷ The oil collected by the state was subsequently awarded to the victors of the horseracing/ charioteering events in the Panathenaic Games.²²⁸ Papazarkadas, in his discussion of Panathenaic oil, totals around 2,100 jars of oil given out in 358/7.²²⁹ He suggests that there was an average of 38.34 litres per jar, and that around 405ml

²²¹ Ober 2015: 152.

²²² Ober 2015: 29. Foxhall 2007: 85-95 details types of olive consumption.

²²³ Foxhall 2007: 89.

²²⁴ Foxhall 2007: 89-90.

²²⁵ The *Constitution of the Athenians* is attributed to Aristotle though some debate exists over its authorship. [Aristotle] *Ath. Pol.* LX.1-3.

²²⁶ Sallares 2007: 28 suggests there may even have been ‘no large-scale olive cultivation before the classical period’.

²²⁷ [Aristotle] *Ath. Pol.* LX.1-3.

²²⁸ *Ibid.*

²²⁹ Papazarkadas 2011: 269.

was collected from each tree, therefore providing an estimate of 198,000 olive trees.²³⁰ It is unlikely that this volume of olives would have been transported out of Attica to be made into oil. Whilst the lack of material evidence does represent an obstacle for my study, I suggest that given the importance of this Panathenaic evidence we cannot rule out oil production in Athens.²³¹

Foxhall attributes the presence of olive presses in Olynthos, but not in Athens, to the higher fruit yields witnessed in Northern Greece.²³² This may explain the prominence of early olive crushing technology in Olynthos compared to other *poleis*. Nonetheless, we should not overlook the possibility that wooden presses and other multi-purpose tools for olive processing were the prominent method by which oil was produced in Athens and Attica.²³³ In Attica less rainfall perhaps resulted in lower fruit yields, thus, resource-intensive large stone presses may have been inefficient.²³⁴ This may have led to an Attic preference to use wooden presses, as well as other multi-purpose wooden tools, which could also be used in the production of wine.²³⁵ These wooden tools, if extant, would be nearly impossible to distinguish in the archaeological record as specific to the processing of olives. All of this demonstrates, that while it is difficult to prove the existence of olive oil processing in Attica, we should assume that oil production took place.

Whilst it is difficult to assess the material remains pertaining to oil production and cultivation in Athens there have been surveys undertaken in Athens and Attica to assess the stratification of any extant evidence. Lohmann's 1993 survey of Atene in Southwest Attica purports to show up to 48 different ancient farm sites, with at least 5 having terraces attached.²³⁶ Lohmann's work attempts to assimilate the extant literary evidence with material evidence and his idea that ancient terraced olive groves can be located in the Attic countryside is compelling. Foxhall remains, however, unconvinced by Lohman's findings and Langdon 'cannot add

²³⁰ Papazarkadas 2011: 271.

²³¹ Shear 2001: 407 suggests that some oil was collected yearly by every archon.

²³² Foxhall 2007: 179. Foxhall draws on Theophrastus *CP* 1.20.4.

²³³ Foxhall 2007: 148 'wooden press beds' at Klazomenai. See p. 209 'Pestle and mortar' as olive pressing equipment, and p. 184 'presses were regularly multi-purpose'.

²³⁴ Foxhall 2007: 179. Papazarkadas 2011: 270 is convinced of biennial cropping in Athens with 'on' years which yielded many olives and 'off' years that produced smaller harvests. However, this was likely mitigated by well irrigated groves with trees planted in different years to ensure regular crops. Ober 2015: 28 even suggests low rainfall encouraged olive oil exports.

²³⁵ Foxhall 2007: Multi-purpose presses: 132, 133, 138, 162, 184, and especially p. 202.

²³⁶ Lohmann 1993 quoted in Foxhall 2007: 83-84. See also: Langdon 2013: 245-50.

unassailable arguments to either side'.²³⁷ The truth probably lies in a combination of the two perspectives. Finding datable material evidence for olive cultivation in Attica is a minefield of obstacles and problematic evidence. The volume of epigraphic and literary references are numerous yet we lack large-scale material evidence showing the presence of an olive cultivation or processing space. Therefore, we must accept that the evidence for olive cultivation and processing is limited, but we cannot rule out its existence entirely. Athens, unlike Olynthos, has been continually inhabited, which makes the survival and recovery of evidence more difficult. Klazomenai saw increased use in the Hellenistic and Roman times and the invention of the *trapetum* is difficult to date.²³⁸ Thus, while we cannot be sure of the level or detail of Athenian olive processing in the Archaic or Classical periods, it is reasonable to suggest that olive processing occurred.

The cultivation of olives in the Athenian environment helped to shape the cultural imaginary. In this case study I will look at the evidence from non-economic institutions which demonstrate how this presence disseminated into the economic sphere. This will entail assessing the cultural significance of the olive by looking at the religious importance of the olive and olive oil as well as the Athenian myths and literature. Following this assessment of the culturally-embedded, non-economic institutions I will trace the significance of the olive through the economic institutional levels. I will necessarily draw on a legal dispute concerning the olive, recorded by Lysias, before discussing Solon and his influence on the development of the Athenian *polis*. In this case study, I argue that Solon's legislation and reforms utilised environmental policies to achieve 'social stability' in Athens and to institutionalise and formalise pre-existing structures in Athenian society.²³⁹ This will illuminate the olive's, and the environment's, inter-institutional importance. I will then discuss previous scholarship on Solon in NIE study undertaken by Lyttkens and the benefits and limitations of his work. This discussion will allow me to fully integrate the olive into my framework to demonstrate the importance of the human-created environment in the development of Athenian *polis* institutions.

²³⁷ Foxhall 2007: 84. and Langdon 2013: 245.

²³⁸ Foxhall 2007: 165-166 '*trapetum* must be derived from a Greek word, *trapeo*,' which means 'to squash up [grapes]'.

²³⁹ Canevaro 2022.

3.2 Non-Economic Institutional Importance

Some scholars have made connections between the environment and economic institutions. For instance, Bresson discusses overland versus maritime trade costs.²⁴⁰ Furthermore, Horden and Purcell note the connection between the environment and cultural symbolism; for example, the connection between the olive and Athena.²⁴¹ Nonetheless, these connections have not been made in a single framework from which we can trace the environment's impact on religion through to the economy. I propose that by integrating the human-created environment, at the zero level, in such a framework we can trace both its economic and non-economic institutional importance. Non-economic institutions are those which are in the first level of Williamson's framework and are thus not considered as first-order economising.²⁴² The most prominent of these institutions is religion, but this level also includes all culturally embedded aspects of a society, such as customs, traditions, and norms. The olive is a prime candidate for this case study because it reveals elements of the 'human-created' environment; the institutional importance of which we can trace through religious and economic activity.²⁴³

Nikolaos Papazarkadas's work on *morai* is instrumental in our understanding of the religious significance of the olive. He raised the question as to whether the sanctity of the olive was truly sacred or simply superficial.²⁴⁴ Papazarkadas argues in favour of the sanctity of the olive, drawing on a case brought before the Areopagus in which a defendant is accused of 'encroaching' on land with *morai* on.²⁴⁵ Not only did the areopagus deal with religious cases (as we shall see with the discussion of Lysias 7 below) but the verb 'ἐπεργάζεσθαι' is used; this verb denotes trespassing explicitly on sacred land.²⁴⁶ Furthermore, Papazarkadas notes the religious importance of olive wood by citing an anecdote recorded by Herodotus (5.82). Herodotus states that the Epidaurians went to the Delphic oracle to ask for help as their land was barren. In response, Pythia advises them to make the statues of Damia and Auxesia from the wood of the 'cultivated olive' (ἡμέρης ἐλαίης).²⁴⁷ The Epidaurians agree and they ask the Athenians for Attic olive wood; in return the Athenians ask them to offer annual sacrifices to Athena Polias and Erechtheus, and the oracle's resolution worked.²⁴⁸ Thus, Papazarkadas

²⁴⁰ Bresson 2016a: 80-81.

²⁴¹ Horden and Purcell 2015: 429.

²⁴² Williamson 2000: 597.

²⁴³ Merchant 2012: 1.

²⁴⁴ Papazarkadas 2011: 277.

²⁴⁵ Papazarkadas 2011: 278.

²⁴⁶ Ibid.

²⁴⁷ Papazarkadas 2011: 280. Herodotus *Hist.* 5.82.

²⁴⁸ Ibid.

argues that there was an inherent religious value in ‘cultivated’ Attic olive trees, connected to *moriai* and the naming myth, and this does not just apply to the Athenian cultural imaginary but across the Greek world.²⁴⁹

This religious importance is well recorded. Foxhall argues that the existence of *moriai* ‘dedicated to the goddess Athena’, from which Panathenaic oil was produced, gives a new economic ‘dimension to the value of olive oil’.²⁵⁰ Furthermore, this value builds on a ‘pre-existing set of symbolic values’ which demonstrate the embedded cultural importance of the olive.²⁵¹ The religious link to Athena emanates from the naming myth within Athenian thought; where the Athenians held a competition between Athena and Poseidon to become the namesake of the city.²⁵² In the account by Herodotus, Poseidon gifts the Athenians a saltwater spring whilst, the winner, Athena grows an olive tree, on the Acropolis, later said to be the mother from which all other olive trees are propagated.²⁵³ The olive’s religious connection can also be found in the early Archaic period with dedications of protocorinthian *aryballoi* and *alabastra* at Mount Parnes in Attica.²⁵⁴ The *aryballoi* and *alabastra* traditionally held oil and perfume and were perhaps dedicated to Zeus.²⁵⁵

This olive tree is also connected, like Athena, to Erechtheus the autochthon. In Homer, it is Athena who nurtured Erechtheus and gives him his own cultic site on the Acropolis.²⁵⁶ This is significant as next to the Erechtheion is the supposed site of the original olive tree of Athena, which rises from the ground in the same autochthonous manner as Erechtheus himself. Following the Persian wars, the Erechtheion was rebuilt as part of in Pericles’s civic building agenda.²⁵⁷ Papazarkadas even argues that Erechtheus is an ‘*alter ego* of Poseidon’ further highlighting the connection between the olive and the Athenian naming myth.²⁵⁸ Moreover, in his account of the Persian wars, Herodotus notes how (following the razing of the Acropolis), ‘the Athenians, who were ordered by the king to offer the sacrifice, went up to that sacred place, they saw that a new shoot eighteen inches long had sprung from the stump’ of Athena’s

²⁴⁹ Papazarkadas 2011: 281. Herodotus *Hist.* 5.82.

²⁵⁰ Foxhall 2007: 94-95.

²⁵¹ Ibid.

²⁵² Papazarkadas 2011: 281.

²⁵³ Herodotus *Hist.* 8.55

²⁵⁴ D’Onofrio 1997: 72.

²⁵⁵ Ibid.

²⁵⁶ Mitchell 2019: 119.

²⁵⁷ Mitchell 2019: 119-120. Another important building in Pericles’s civic building agenda was the Hephaestion.

²⁵⁸ Papazarkadas 2011: 280.

olive tree.²⁵⁹ This miraculous regeneration becomes symbolic of the Athenians' later victory over the Persians and the olive came to represent Athenian self-identity. It is this idea that spurs Foxhall to suggest that with the consumption of olive oil 'the consumer... embodies a physical reification of being Athenian in its most basic sense,' and one which connects 'being Athenian directly with the realm of the divine via a material food commodity.'²⁶⁰

Given this extensive cultural embeddedness and religious importance of the olive we can begin to understand how it resulted in wider economic phenomena. The olive is sacred in Athenian and wider Greek religion for its connection to Athena. This results in the sanctification of *moriai*, which Papazarkadas claims, belonged to Athena herself.²⁶¹ These trees were the most important Athenian plants, and their oil, as recorded in the *Athenian Constitution*, is used for the Panathenaic victors' prize.²⁶² This oil was particularly valuable, and there is reason to believe that, at one point during the Classical era, it was the only oil that was allowed to be exported out of Athens by victors of the games.²⁶³ Many victors would dedicate at least part of their winnings to sanctuaries, and the deities which they prayed to for their victory, thus, making the product rare and valuable.²⁶⁴ This perceived value also ties in to the legal dispute of *Lysias 7 Before the Areopagus: The Matter of the Olive-Stump*, in which an Athenian faces punishment for supposedly cutting down a *moria*-stump.

The importance of the olive in Athenian culture, however, can also be traced through the legislation of Solon. Solon prohibited the export of all agricultural products except for olive oil. Papazarkadas questions this law arguing that the original Solonian legislation might have been altered, in the fourth century, so that only Panathenaic victors could export oil, or that the Solonian law did not exist until the fourth century.²⁶⁵ I disagree and argue that Solon's law existed first, and it was later modified after the rise of the Great Panathenaia in the 560s, as export limitations were common in the Archaic period.²⁶⁶ Export limitations were used, as Bresson discusses in regards to Teos, as a means to prohibit the exportation of goods needed

²⁵⁹ Herodotus *Hist.* 8.55.

²⁶⁰ Foxhall 2007: 94-95.

²⁶¹ Papazarkadas 2011: 261.

²⁶² Papazarkadas 2011: 262-263.

²⁶³ Papazarkadas 2011: 272-273.

²⁶⁴ Shear 2001: 401 'victors... retained the prize vases in their homes after they had won. Other winners... disposed of at least some of the jars... by dedicating them in sanctuaries... That some vases... with their oil, were dedicated to divinities is further emphasized by dedicatory inscriptions which have been found'.

²⁶⁵ Papazarkadas 2011: 273.

²⁶⁶ Bresson 2016a: 393.

to keep citizens fed, such as wheat and barley, from leaving the *polis*.²⁶⁷ The Panathenaic connection may also explain the not-so-widespread exportation of olive oil which Papazarkadas discusses, as the majority of oil may have been used in the festival.²⁶⁸ I will discuss the distribution of ‘SOS’ and Panathenaic amphorae in more detail below alongside the legal institutions of Solon.²⁶⁹ Nevertheless, the cultural embeddedness of the olive runs deep and has become a lasting symbol of Athens and Greece itself. The conditions of the mainland Greek environment lends itself to olive cultivation. Olive cultivation and processing also remains an important industry for Greece, with Greece being the third biggest exporter of olive oil and oil being high on the list of Greece’s ‘specialised products’.²⁷⁰

This connection between the olive, the environment, and religious symbolism may have been the reason why the olive came to symbolise Athens itself. One manifestation of this symbolism was Athenian coinage. Coinage is an important element of the ancient economy; however, delving into issues of dating in Athens and numismatic symbolism could be the topic of another thesis. I also do not want to overemphasise the importance of coinage. Nonetheless, in the ancient Greek world, coinage often featured the emblems of the *polis* which it was minted in.²⁷¹ It is logical that the Athenians would choose Athena and her owl as their main symbols. However, as Papazarkadas points out, there are ‘revealing’ inclusions on Athenian silver coinage of olive leaves on the helmet of Athena on the obverse, and an olive sprig on the reverse.²⁷² Furthermore, Anghelina has posited that the olive sprig ties in with the lunar crescent as emblematic of the Panathenaia.²⁷³ Her argument centres around the idea that Athenian coinage was closely tied to the celebration of Athena’s birthday on the third day of the Panathenaia.²⁷⁴ This demonstrates how the level three institution of coinage was influenced by the religious symbolism of environment. Ultimately, Athens represented itself through a numismatic device that contained an olive sprig which shows how important the olive was and how the religious connection of the olive can enter the economic realm. This interpretation is furthered by van Wees who suggests that Hippias, following his exile from Athens, recreated

²⁶⁷ Bresson 2016a: 393 see also 338 for ‘chronic’ nature of shortages.

²⁶⁸ Papazarkadas 2011: 273. ‘The exportation of olive oil cannot have been as widespread a phenomenon as students of Classical Athens uncritically assume’.

²⁶⁹ Johnston and Jones 1978 and Pratt 2015 on ‘SOS’ amphorae.

²⁷⁰ Observatory of Economic Complexity 2022: Olive Oil. Observatory of Economic Complexity 2022: Greece.

²⁷¹ Ober 2015: 39.

²⁷² Papazarkadas 2011: 260.

²⁷³ Anghelina 2017: 175-183.

²⁷⁴ Ibid.

the Athenian owl obol at Sigeum and that he replaced the olive sprig with an ear of wheat.²⁷⁵ This heightens the specifically Athenian connection to the olive as its primary product.

3.3 Economic Institutions

I have explored the ways in which the olive is important within Athenian myth, visual culture, and religion. These constitute the most embedded cultural norms and ideas which lay the foundations of legal and governance institutions. One way we can clearly see the impact of the Athenian religious and cultural connection to the olive is in the legislative protection of *moriai*. The best extant example of the legal institutionalisation of the *moriai* is recorded in Lysias 7 *Before the Areopagus: The Matter of the Olive-Stump*. This early fourth century Athenian legal case concerns a man accused of removing an olive-stump from his land during the Archonship of Souniades (397-396 BCE).²⁷⁶ The timing of this case is noteworthy as it takes place following the Peloponnesian War which drastically changed the Athenian political and environmental landscape. In this case the land, on which the *moria* grew, was seized by the Five Thousand from its original owner (Peisander) due to his involvement with the Four Hundred in the revolution of 411 BCE.²⁷⁷ The land was unsold for over three years before being given to Apollodorus of Megara who cultivated the land until shortly before 404. It was then purchased by the defendant after the fall of the Thirty in 403.²⁷⁸ The three-plus years gap, between 411 and Apollodorus's cultivation and the time before the defendant purchased the land, means the *moria* could have been damaged either by disease/ livestock or by Lacedaemonian, Boeotian, or Thessalian troops.²⁷⁹ It is sensible to suggest this is the reason why the case brought against the defendant is over a (perhaps mutilated) olive-stump and not a whole *moria*.

What is remarkable, however, is the clear institutionalisation of this legal procedure. Not only are *moriai* institutionally protected, and their fruit used for Panathenaic victors' oil,²⁸⁰ but their religious differentiation appears to stretch over not just private/ public land but over both productive and unproductive trees.²⁸¹ The legal protection of unproductive trees is deeply

²⁷⁵ van Wees 2013: 125-126.

²⁷⁶ Lysias 7.11.

²⁷⁷ Lysias 7.4.

²⁷⁸ Lysias 7.4-7.8.

²⁷⁹ Lysias 7.6 see also footnotes to Loeb translation by Lamb 2015: 149.

²⁸⁰ Foxhall 2007: 94-95. Interestingly in Lysias there are ambiguous 'men who had bought the produce of the sacred olives' (7.2-3).

²⁸¹ Including burnt trees Lysias 7.24.

significant. One way to interpret the protection of unproductive trees is that the trees themselves were deeply religiously and culturally significant within the Athenian psyche regardless of productivity. Another interpretation was suggested by Christopher Carey, who proposed that *moriai*, even the stumps of *moriai*, were protected due to the extreme resilience of the olive tree, which have ‘remarkable regenerative powers’.²⁸² Yet, we know from the *Athenian Constitution* that oil was later collected from all the trees on land which *moriai* grew on, and not just from the specific sacred trees. This change in procedure may be explained by the destruction and loss of many olive trees, and *moriai*, during the Peloponnesian war, as we potentially see in Lysias, or as a result of disease. To rectify this, the Athenian *boule* may have decided to collect oil from any property with a *moriai* (productive or unproductive) on its land to maintain the oil supplies for the Panathenaic prizes. This demonstrates the importance of the sacred oil and that legal institutions were adapted to suit the environmental conditions and to maintain tradition.

The olive’s institutional importance and its connection to both the legal and governance spheres is clear. By protecting *moriai* with the threat of ‘the severest penalty’, we can see the importance that the olive had in Athenian culture and legislation.²⁸³ There is no doubt that the economic ramifications of the state levies of these *moriai* is yet another reason to enshrine them in legal protection. To further this, the defendant against Nicomachus, in Lysias 7, states he would not even consider removing one of the many *moriai* on his land as he has ‘as great a regard for them as for my native land and my whole property realising that it is the loss of both of these that I have at stake.’²⁸⁴ This highlights the religious value the Athenian citizens bestow upon the *moriai*. The defendant finds it inconceivable that he could injure Athens by removing the stump. In this speech, as Carey suggests, we also learn that the penalty from the removal of a *moriai* or its enclosure (the *sekos*) was exile.²⁸⁵ This elucidates the defendant’s suggestion that he is concerned with the loss of his native land (τὴν πατρίδα) because if he was found guilty his citizenship would be revoked.²⁸⁶ Therefore, we can begin to see how the religious institutionalisation of the human-created sacred olive influenced *polis* institutions such as citizenship.

²⁸² Carey 2012: 249.

²⁸³ Lysias 7.15-16. ‘μεγίστης ζημίας ἐκινδύνευον’.

²⁸⁴ Lysias 7.25.

²⁸⁵ Carey 2012: 249.

²⁸⁶ Lysias 7.25.

3.4 Solon

The legislation and reforms of Solon offer an opportunity for this case study to analyse the ways in which the environment and the olive shaped (or was shaped by) level two and three legislative and governmental efforts. As I have suggested above, the ‘human-created’ environment can be considered as an institution.²⁸⁷ Solon's legislation can be categorised as part of the ‘human-created’ environment as it demonstrates human interaction with the natural world. For instance, Solon encouraged domestic agricultural trade by banning all agricultural exports except olive oil to mitigate the threat of famine.²⁸⁸ Moreover, the figurative removal of *horoi* may also have increased the Athenian potential for agricultural production by implementing *eunomia* and limiting the exploitation of *hektemoroi*.²⁸⁹ Thus by looking at Solon's legislation we might begin to understand the role the environment played in shaping the Athenian economy. The connection between the environment, specifically the olive, and Solon is recorded in Plutarch's *Life of Solon*. The account recalls how Epimenides of Phaestus ‘purified’ Athens, ‘pav[ing] the way for [Solon's] legislation’ asking in return ‘nothing more than a branch of the sacred olive tree’ (XII.4-6).²⁹⁰ This excerpt from Plutarch shows that the olive was a significant religious symbol in Athens, and around the Greek world, which may help us to understand the impact of the environment on subsequent institutions.²⁹¹ Solon provides ample source material which may help us to understand how the environment operates at different levels of NIE analysis.

3.4.1 Sources

Much of the information surrounding Solon, as Mischa Meier suggests, is disputed due to the ‘disparate’, ‘contradictory’, or ‘corrupted’ nature of the tradition.²⁹² This includes our main sources: the *Athenian Constitution* and Plutarch's *Life of Solon*. The authorship of the *Athenian Constitution* has been attributed to Aristotle although this is debated. Even if the constitution was Aristotelian, Aristotle was writing centuries after Solon's archonship raising concerns over its accuracy. Later sources including Herodotus and Plato discuss Solon's trips to Egypt and

²⁸⁷ Merchant 2012: 1.

²⁸⁸ Plutarch *Solon* XXIV.

²⁸⁹ Harris 1997: 103.

²⁹⁰ Perrin translates this as ‘branch’; however, *θαλλός* can also be translated as young shoot, which could change the nature of the translation, moving from an unproductive branch to a productive shoot. A productive shoot could have an even greater religious meaning. Perrin 1914: 435. See: *θαλλός* in Liddell and Scott 2013: 358.

²⁹¹ Papazarkadas 2011: 262.

²⁹² Meier 2006.

Sardis but their reliability is also questioned.²⁹³ Plutarch's biography of Solon appears as part of his *Parallel Lives* where Plutarch compares him to Publius Valerius Publicola, likely for the latter's role in assisting Lucius Junius Brutus to overthrow the monarch Lucius Tarquinius Superbus, just as Solon replaced the 'unchallenged aristocracy' of Athens.²⁹⁴ Whilst careful judgement should be employed when using these sources, Plutarch refers to *axon* numbers for Solon's laws.²⁹⁵ These *axones* were rotating wooden tablets inscribed with Solonian laws. Thus, while there is confusion regarding whether some laws can be considered genuinely Solonian, or whether a law was 'projected back onto Solon' by later orators, we can suggest that laws which are attributed to Solon alongside an *axon* number are reliable.²⁹⁶ Furthermore, Rhodes suggests that the similarities between the *Athenian Constitution* and Plutarch's account are the result of a third source that both works utilised; this (now lost) third source may have been cross referenced with the *axones* available to Plutarch and as such we should not wholly discount Plutarch nor the *Athenian Constitution*.²⁹⁷

Nonetheless, Meier's concern over the 'corruption' of the historical record is valid.²⁹⁸ Plutarch was writing in the second century CE, circa 700 years after Solon's archonship, and this distance from his material should not be neglected. Another issue regarding the verisimilitude of Solon's laws is Plutarch's claim that, under Solon, the export of any agricultural good, other than olive oil, resulted in a 100 drachma fine.²⁹⁹ Drachma coins would not be in common use in Athens until the middle of the sixth century at the earliest.³⁰⁰ If the drachma fine, in this context, is accepted as referring to coinage – it should be considered apocryphal. However, the metric drachma also refers to a handful which is a measure of silver. The *Athenian Constitution* does suggest that Solon reformed the weight of the drachma, thus, there is perhaps room to suggest that Plutarch's law does not refer to a coinage fine but rather 100 handfuls of silver.³⁰¹ As Kroll and Waggoner discuss, while the terminology may have been adopted for a numismatic purpose it does not demonstrate proof of coinage.³⁰² Although

²⁹³ Herodotus *Hist.* 1.29-34. Plato *Critias* 108D, 110B, 113A. On the reliability of the Herodotean Solon see: Chiasson 2016: 26-28. Rasheed and Auffret 2017: 250- 253 doubt *Critias* as a genuine Platonic work.

²⁹⁴ Lendering 2020. Lewis 2008: 36.

²⁹⁵ van Wees 2013: 12, 151. In note 26, van Wees argues that the law is genuine due to the mention of its *axon* number.

²⁹⁶ van Wees 2013: 87.

²⁹⁷ Rhodes 2006a: 252.

²⁹⁸ Meier 2006.

²⁹⁹ Plutarch *Solon* XXIV.

³⁰⁰ Kroll and Waggoner 1984: 333.

³⁰¹ [Aristotle] *Ath. Pol.* XX.

³⁰² Kroll and Waggoner 1984: 333.

this complicates the debate as to how Solon impacts the Athenian economy, it does not discount any attempt to demonstrate Solon's influence. I will argue that despite the drachma punishment recorded in Plutarch, a law banning all agricultural exports, apart from olive oil, is plausible. Another source which discusses Solon is Diogenes Laertius' *Lives of Eminent Philosophers*. Yet, just as with Plutarch, the distance between the time of the writer, and Solon, cannot be ignored.

3.4.2 Solon's appointment as Archon

The background for Solon's appointment as archon in 594 BCE was one of civil unrest.³⁰³ As Harris suggests, Solon's poetry attributed Athens's social disfunction to *dysnomia* or the general disregard for laws (Solon fragment 4 line 31).³⁰⁴ Solon was thus able to present himself as the implementer of *eunomia*, or the respect of law, to establish peace (fragment 4 line 32). The *dysnomia* of late seventh century BCE Athens included: the aftermath of the Cylonian affair, Draco's 'uniformly severe' legislation, as well as an untenable economic situation, and civic disputes.³⁰⁵ Before Solon, Athens had been subject to a 'unchallenged aristocracy'; however, with the development of trade in the Greek world a 'middling' class of Athenians began to emerge.³⁰⁶ Tensions likely rose as, despite their above average wealth, the *Zeugetai* were unable to serve in certain political positions which was based on membership to the aristocracy and operated on social rather than financial capital.³⁰⁷ This may have led to an increased threat of violence and *dysnomia* from those who felt they were not represented.

This situation of *dysnomia* was further complicated by the dual issues of *horoi* and *hektemoroi*. *Horoi* were boundary stones set throughout Athens and *hektemoroi* have been interpreted as people who had to pay 1/6th of their harvest to the land owner or, as Harris suggests, as a form of gift giving or tribute/ tax in return for protection - similar to the Roman institution of *clientes*.³⁰⁸ Solon's poetry claims that he removed the *horoi* of Athens setting the 'dark earth' of Attica 'free' (fragment 36). However, the purpose of these *horoi* are debated. Some, like Lyttkens, suggest that the removal of these *horoi* is equal to the cancellation of debt

³⁰³ Williamson 2000: 598 suggests times of 'discontent' including 'civil wars' are the times when institutions are most susceptible to change.

³⁰⁴ Harris 2002: 426.

³⁰⁵ Leão and Rhodes 2015: 18-19 (eBook Edition). See also: Ober 1989, 2022.

³⁰⁶ Lewis 2008: 36. 'Middling' class of *Zeugetai*, i.e., men wealthy enough to either to be 'yoked together' as *hoplites* or own a yoke of oxen. It is a debated term in Rhodes 2006a, 2006b, and is debated in Raaflaub 2006: 413-414 and van Wees 2006: 364-366.

³⁰⁷ Rhodes 2006b.

³⁰⁸ Harris 1997: 107, 110.

because, in the Classical period, *horoi* were used as mortgage stones which were only removed when the debt was settled.³⁰⁹ Harris has taken a more metaphorical perspective, when interpreting the meaning of *horoi*, and suggests these boundaries were not literal but rather they represented the issues dividing the people of Athens just as Solon stands like a ‘*horos*’ in-between the arguing factions of Athenians (fragment 37 lines 9-10).³¹⁰ Another contributing factor to the *stasis* of Athens was the position of *hektemoroi*. Many people fell into the bracket of *hektemoroi*; however, paying a 1/6th tribute/ tax was untenable in bad harvests. Consequently, many Athenians became slaves, were forced to pledge their family members into slavery as collateral for their amassed debt, or, if they could avoid total enslavement, entered into debt-bondage.³¹¹ This discussion will form a key part of my analysis below.

Ultimately, Solon would implement extensive changes to Athenian life in an attempt to stabilise Athenian society.³¹² The most prominent of which were the prohibition of enslaving a free-born Athenian citizen and the subsequent emancipation of Athenian-born slaves, a new ‘formal assembly’ where citizens could publicly view proceedings which limited the power of officials, and the institutionalisation of a wealth-based class system.³¹³ Under these reforms life for Athenians changed and a short period of relative peace was ushered in. The institutions formalised by these reforms could be the subject of their own thesis; however, it is the intersection of the environment and legislation which makes Solon useful for this case study. This is due to one specific law that was introduced under Solon: the prohibition of all agricultural exports except olive oil.³¹⁴

3.4.3 The Prohibition of Agricultural Exports

Solon's legislation that prohibited all agricultural exports from Athens except for olive oil is particularly pertinent to my case study. This law is recorded by Plutarch who states:

‘Of the products of the soil, [Solon] allowed oil only to be sold abroad, but forbade the exportation of others; and if any did so export, the archon was to pronounce curses upon them, or else himself pay a hundred drachmas

³⁰⁹ Lyttkens 2013: 73.

³¹⁰ Harris 1997: 103-104.

³¹¹ Morris 2002. See also: Diogenes Laertius *Solon* 45-46. Harris 2002: 429-430. Debt-bondage continued into the Classical era and ‘provided Athenians with a crude way of reconciling the rights of creditors and debtors.’

³¹² Canevaro 2022: 401-402.

³¹³ Ober 2015: 149-151.

³¹⁴ Plutarch *Solon* XXIV.

*into the public treasury. His first table is the one which contains this law.*³¹⁵

Whilst the verisimilitude of this law has been questioned, I, nevertheless, suggest that a law preventing all agricultural exports apart from oil did exist. My reasoning is twofold. Firstly, Plutarch mentions that this law is recorded in Solon's first table (πρῶτος ἄξων).³¹⁶ The *axones*, inscriptions of laws attributed to Solon, likely still existed in some form during the Classical period and perhaps down to the time of Plutarch.³¹⁷ Thus, Plutarch could not make an unsubstantiated claim if the *axones* were still extant in Athens. A second reason why I am convinced that a law such as this could have existed is because there are other records of other archaic *poleis* which limited their foreign exports. For instance, in Bresson's discussion of the grain trade he accepts Solon's law as plausible and draws on a similar law which was in place in Teos.³¹⁸ Bresson also discusses how Selymbria prohibited grain exports in order to ensure that there was enough food to eat - following a famine in the previous year.³¹⁹ Furthermore, 'low-value barley' grew better than 'high-value wheat' in the Athenian environment, thus, Ober suggests the Athenians opted to specialise in high-value crops such as olives to increase profits and would have imported wheat which could not be sustainably grown there.³²⁰ This provides a simple reason why the exception of olive oil may have been made by Solon. The exportation of oil would provide an income for Athenian citizens and the subsequent profit enabled them to import wheat and subsidise their food crop levels. At the same time, if any Athenian barley was exported then more produce would have to be imported to minimise the real threat of famine. Thus, we can begin to see why such a law would be an appealing proposition for the Athenian archon.

In addition, we must also consider the value of Athenian olive oil. In Athens, a select number of olive trees were sanctified and were referred to as *moriai*. These *moriai* gained further significance as their oil was the prize given to horseracing/ charioteer victors in the Panathenaic Games.³²¹ Ober notes how the Panathenaic oil was considered exemplary and was a luxury commodity.³²² Furthermore, Bresson suggests that the victors oil was intended for sale

³¹⁵ Plutarch *Solon* XXIV.

³¹⁶ Ibid.

³¹⁷ See also: van Wees 2013: 12, 151 and Rhodes 2006a: 252 on *axones*.

³¹⁸ Bresson 2016a: 393.

³¹⁹ Bresson 2016a: 395.

³²⁰ Ober 2015: 28.

³²¹ [Aristotle] *Ath. Pol.* LX.1-3.

³²² Ober 2015: 152.

in ‘foreign market[s]’ due to the high-quality ‘reputation of Athenian oil’.³²³ I also agree with Foxhall’s suggestion that the sanctity of *morai* added a new ‘dimension’ to the ‘value’ of Attic oil.³²⁴ This is a significant idea as it suggests that a human-created environmental institution, at the zero level, influenced the religious institutions, resulting in the sanctification of *morai*. The protection of *morai*, evidenced in Lysias 7, and the use of the *morai* oil in Panathenaic amphorae, further demonstrate the institutionalisation of the Athenian environment in the legal and cultural realms. It is likely that the religious institutionalisation of the *morai* occurred in pre-Solonic times, and this may have resulted in the legislative decision not to ban the export of oil, because, as I have discussed, it was a high-value export for Athens. This shows how the human-created environment at the zero level, can influence the subsequent institutional levels in religion, legislature, and price.

Lyttkens argues that the motivation behind Solon's laws was to maintain the position of the elites whilst ceding minimal ground to the common Athenian.³²⁵ Through this lens, the prohibition of agricultural exports safeguards elite profits because maintaining an olive grove and producing oil was an expensive business.³²⁶ Due to the time it takes for olive trees to reach maturity many olive trees were interplanted with faster growing almond trees so that the land owner could begin to earn income.³²⁷ The delay in income places olive cultivation into a realm that only the elites could afford. Furthermore, even if enterprising Athenians attempted to produce perfumed oil from wild olive trees the associated costs would have been prohibitively expensive.³²⁸ In this view, the limiting of exports could be seen as a way to maintain elite income and Solon can be seen to have caused the Athenian economy to specialise which, in turn, increased the value of Athenian oil.³²⁹

However, this interpretation relies on the assumption that Solon had the macro-economic *nous* to understand the theory of comparative advantage, outlined by Ricardo, and the environmental conditions which result in this variation in productivity.³³⁰ Instead we should

³²³ Bresson 2016a: 405.

³²⁴ Foxhall 2007: 94-95.

³²⁵ Lyttkens 2013: 73.

³²⁶ Foxhall 2007: 59-60 even small farms were ‘expensive’.

³²⁷ Foxhall 2007: 113. Theophrastus *CP* 3.10.4-11 on the olive and myrtle being companion plants as well as apple and pomegranate trees.

³²⁸ Foxhall 2007: 89 ‘the manufacture of perfume was a specialist craft’.

³²⁹ Ober 2015: 153.

³³⁰ See Findlay 1991: 99-107 on Ricardo and comparative advantage and Costinot and Donaldson 2012: 453-458 for environmental variation.

assume that Solon's law, which prohibited agricultural exports, was aimed at maintaining Athenian supplies by preventing the export of grain as Leão and Rhodes argue.³³¹ From this perspective, the law does not set out to promote the exportation of Athenian oil *per se* but rather attempts to ensure that poorer Athenians could afford grain even in years of reduced harvests. It also aims to prevent price scalping through the re-exportation of grain. This links to Demosthenes's fourth-century *Plea of Chrysippus against Phormio* (34.36-37) which cites a law preventing any Athenian resident from transporting grain to a *polis* other than Athens. Furthermore, in *Androcles Against Lacritus* (35.50-51), Demosthenes records a law which prevented even the lending of money by an Athenian resident, citizen or metic, for the purpose of transporting grain to a different *polis*.

Alongside Demosthenes, the *Athenian Constitution* records the classical institution of *sitophulakai* or grain wardens who ensured that two-thirds of all grain which passed through the port of Piraeus was taken to market in Athens and sold at a fair price (LI.3-4). Furthermore, in his discussion of the rules of the *emporion*, Bresson examines Lysias's *Against the Grain Dealers* which stated that Athenian grain buyers were limited to 50 measures of grain.³³² Bresson shows that these grain dealers were not only limited by the number of measures they could buy but that they also had to declare how much grain they intended to sell and at what price.³³³ This resulted in a uniform grain price in both the Athenian *agora* and the *emporion* at Piraeus and prevented the hoarding of grain and price scalping between the two marketplaces.³³⁴ This demonstrates the Athenian concern with maintaining low grain prices for citizens. Thus, it is likely that Solon's law is an attempt to maintain Athenian grain prices and ensure the availability of domestic agricultural produce. The export of oil was not affected by this as it was not an essential commodity.

Given its status as a non-essential commodity, and its ease of transportation, there may have already been an expanding specialisation in the Athenian export economy towards oil and pottery before Solon. In Johnston and Jones's study of amphorae and their distribution they suggest 'good quantities of olive oil were shipped from Attica during the seventh century'.³³⁵ However, their analysis of the distribution of amphorae suggests exportation 'trailed off'

³³¹ Leão and Rhodes 2015: 186-187 (eBook edition).

³³² Bresson 2016a: 313-317. Lysias *Against the Grain Dealers* 22.5-6.

³³³ Bresson 2016a: 315.

³³⁴ *Ibid.*

³³⁵ Johnston and Jones 1978: 140.

following Solon's legislation despite Solon's attempt to 'stimulate' it.³³⁶ Whilst there could be many reasons for this decline, Johnston and Jones suggest it was a result of an increase in domestic production of oil in other *poleis*.³³⁷ It may also have been due to Solon's focus on maintaining supplies of cheap grain in Athens instead of increasing the exportation of oil.

In her 2015 update to Johnston and Jones's work, Pratt notes the 'wave-like' pattern of SOS amphorae distribution and demonstrates that there was still oil exportation following Solon's legislation.³³⁸ Pratt also discusses how a small number of amphorae in one location does not represent a 'single importation event' but rather a continued accumulation of amphorae over time.³³⁹ Furthermore, Pratt mentions the development of Panathenaic amphorae which are exported after Solon's legislation.³⁴⁰ While Johnston and Jones made salient observations regarding a small decline in SOS amphorae, Pratt demonstrates that following Solon's legislation oil exports did not end altogether. Johnston and Jones themselves refer to the increase in the production of decorative pottery which may be a result of Pratt's suggestion that the Phoenicians had a large role to play in the export of Athenian oil.³⁴¹ Phoenicians may have transported oil in reused Attic amphorae or Phoenician 'torpedo' style amphorae.³⁴² This makes it difficult to quantify the amount of oil that was exported following Solon's legislation, but we should not discount oil exportation in the time of Solon, or following his legislation. Ultimately, we should see the law as an attempt to limit the exportation of necessary crops to mitigate the risk of famine, whilst still providing some income for Athenians.

Overall, the prohibition of all agricultural exports except for olive oil should be considered a genuine law of Solon because Plutarch mentions the law's *axon* number and there is precedent for prohibition of exports laws in other archaic *poleis*. One reason for the exception of olive oil may be the cultural value ascribed to the oil through the human-created environmental institution of the *morai*. In this view, Athenians may have stood to profit from their specialisation into luxury oil exports. However, this relies on the assumption that Solon had the macro-economic understanding of comparative advantage to implement a specialised economy. Thus, the law is likely aimed at maintaining the availability low price of grain in

³³⁶ Johnston and Jones 1978: 140.

³³⁷ Ibid.

³³⁸ Pratt 2015: 231.

³³⁹ Pratt 2015: 230-231.

³⁴⁰ Pratt 2015: 231.

³⁴¹ Johnston and Jones 1978: 140. Pratt 2015: 231.

³⁴² Pratt 2015: 231.

Athens even in times of poor harvest. This is corroborated by later Athenian laws found in Demosthenes, Lysias, and also in the *Athenian Constitution*. Nevertheless, Johnston and Jones, show that there was likely oil exports which predate Solon and Pratt shows these exports continue after Solon. This shows us that the environment was indeed a consideration for Solon and should view his reforms as influenced by the human-created environment. This is supported by the bounty Solon places on wolves in archaic Athens, reported by van Wees, as a method of reducing threats to domestic livestock.³⁴³ Solon understood the very real threat of famine and so focussed on maintaining the availability of low price grain to stabilise Athenian society. The export of oil did not interfere with this as it allowed Athenian citizens to profit. This likely helped to bolster the Athenian economy, even if it did not increase the long-term stability of the Athenian political sphere with three ‘tyrannical coups d’état’ in the century following Solon.³⁴⁴

3.4.4 Solon in NIE

In 2013, Solon was studied as part of a NIE investigation by C. H. Lyttkens who dedicated a subchapter of his work on Athenian institutions to Solon’s reforms.³⁴⁵ Lyttkens does not approach the subject as an ancient historian; rather, his approach attempts to analyse Solon’s economic decisions and motivations. As a result, Lyttkens perhaps misinterprets the ancient sources and suggests that the main economic institutional change which Solon implements is the alleviation of ‘economic problems of the ordinary people by cancellation of debts’.³⁴⁶ Lyttkens attributes this to Solon’s removal of *horoi* and the ‘freeing’ of the *hektemoroi* which were attempts to negate the ‘revolutionary situation’ which faced Solon.³⁴⁷ However, it is unlikely that Solon did cancel all debt and instead this interpretation should be seen as a conflation of *horoi* with mortgage stones. In this section, I will discuss Lyttkens’s ideas to see how NIE has been utilised in the study of Solon. However, I shall also draw on the ideas of other scholars, particularly Harris and Canevaro, who have made significant contributions to the topic.

³⁴³ van Wees 2013: 137. Plutarch *Solon* XXII.

³⁴⁴ Ober 2015: 152.

³⁴⁵ Lyttkens 2013: 72. Outside of NIE, Solon has been studied extensively. Notably in the volume edited by Blok and Lardinois 2006.

³⁴⁶ Lyttkens 2013: 73.

³⁴⁷ Lyttkens 2013: 73-74.

Unlike Lyttkens, Edward Harris (1997) suggests that the removal of *horoi* should not be conflated with the cancellation of debt as this interpretation does not consider the metaphorical interpretation of *horoi* in Solon's poetry. The cancellation of debts is often linked to Solon's fragment 36 which is also documented in the *Athenian Constitution*: 'Black Earth, would best bear witness, for it was I who removed her many boundary-stones implanted: before she was a slave, but now is free'.³⁴⁸ Yet, as Harris argues, this does not corroborate the idea that Solon cancelled all mortgages.³⁴⁹ *Horoi* only came to denote mortgages in the Classical period so it is unlikely that Solon's poetry was referring to this phenomena.³⁵⁰ Instead, Harris puts forward his answer to the 'riddle' of *seisachtheia* suggesting it refers to Solon's attempt to replace *dysnomia* with *eunomia* and minimise exploitation such as the commonplace 'payment for protection and maintenance' that the *hektemoroi* were subject to.³⁵¹ Thus, the removal of *horoi* was not a wholesale cancellation of debts but rather a metaphor expressing the shaking off of the burdens or the *seisachtheia* which Solon achieves with the removal of the *dysnomia* and other social factors which had contributed to the situation of *stasis*.

In addition to Harris, Ober argues that *horoi* do not denote 'indebtedness' but rather they express 'limited territorial access' in which some Athenians would not have access to certain land or *polis* institutions.³⁵² Ober's argument is compelling, and offers an explanation for the Solonic law against '*hubris*' and 'humiliating' or 'intimidating' any Athenian citizen thus the expansion of common Athenian land is can be seen as legislation to promote this Athenian equality.³⁵³ *Horoi*, in Ober's view, are literal territorial boundary stones which suggests fragment 36 is not a declaration of the cancellation of debts but rather a removal of boundaries across Attica. Whilst some boundary stones exist in the archaeological record, I agree with Harris's suggestion that the language employed should be taken as a metaphor, given that Solon refers to himself as a boundary stone standing between the opposing factions of Athenian society (fragment 37). However, no scholar suggests any environmental implication of the removal of the (literal or metaphorical) *horoi* which may have increased the opportunity for Athenian agricultural production by limiting *stasis* and economic exploitation of the *hektemoroi*.

³⁴⁸ [Aristotle] *Ath. Pol.* XII.4 'Γῆ μέλαινα, τῆς ἐγὼ ποτεόρους ἀνεῖλον πολλαχῆ πεπηγότας, πρόσθεν δὲ δουλεύουσα, νῦν ἐλευθέρα'.

³⁴⁹ Harris 1997: 104.

³⁵⁰ *Ibid.*

³⁵¹ Harris 1997: 103.

³⁵² Ober 2015: 150.

³⁵³ *Ibid.*

Lyttkens attempted to demonstrate the utility of a NIE approach by looking at the incentive of Solon's 'cancellation of debt' as a way to avoid the 'revolutionary situation' that Solon faced.³⁵⁴ While he was misguided, NIE does offer a way to assess the incentive of Solon's reforms: the stabilisation of Athenian society. Mirko Canevaro has proposed that the reforms of Solon could be seen to have reduced social mobility in order to promote stability and *eunomia*.³⁵⁵ For instance, Harris shows that Solon did not abolish debt bondage but rather 'denied creditors the ability to sell [debtors] into slavery' to recover their loans.³⁵⁶ Therefore demonstrating that downward social mobility was also a concern for Solon and that social stability was preferred. Canevaro furthers this interpretation, suggesting that Solon's reforms were not based on 'sid[ing] with any part of the city' but were rather institutionalising more rigid social structures in order to provide the correct levels of *time* and justice to each stratum of Athenian society.³⁵⁷ This can be linked to Solon's prohibition of all agricultural exports except oil which was likely designed to keep grain prices low for Athenian citizens and prevent elite profiteering and their *koros* (satiability or lack thereof) - as I have discussed above in relation to later classical Athenian laws.³⁵⁸ Ultimately, this demonstrates the connection between Solon's desire for stability and his utilisation of human-created environmental legislation such as the prohibition of certain agricultural exports.

Another institutional change introduced in Solon's legislation is the law which required a father having to teach his son a trade. The law is recorded by Plutarch:

*'[Solon thought] most of the country [of Attica] was unfruitful and worthless, and that seafaring men are not wont to import goods for those who have nothing to give them in exchange, he turned the attention of the citizens to the arts of manufacture, and enacted a law that no son who had not been taught a trade should be compelled to support his father.'*³⁵⁹

To begin, it is necessary to tackle the claim that Attic soil as 'unfruitful' given that fragments of Solon's poetry, in the *Athenian Constitution*, address the Attic land as 'Γῆ μέλαινα', black or dark earth.³⁶⁰ The connotation that black earth carries is usually positive and is used by Solon

³⁵⁴ Lyttkens 2013: 73-74.

³⁵⁵ See Canevaro 2022: 386-387 on *eunomia*.

³⁵⁶ Harris 2002: 430.

³⁵⁷ Canevaro 2022: 388.

³⁵⁸ Canevaro 2022: 381-382 on *Koros*. For later laws see Demosthenes 34.36-37 and 35.50-51, Lysias 22.5-6, and [Aristotle] *Ath. Pol.* LI.3-4.

³⁵⁹ Plutarch *Solon* XXII.

³⁶⁰ [Aristotle] *Ath. Pol.* XII.4.

alongside ‘fertile soil’ ‘πειράς χθονός.’³⁶¹ However, Canevaro notes that the choice of ‘χθονός’ within Solon’s poetry may be a deliberate invocation of the ‘mortal’ earth rather than the agricultural connotations of ‘γῆ’ and thus connected to the metaphorical privileges and *timai* of the Athenian ‘πατρίδος’ not the level of soil fertility.³⁶² Canevaro notes how this law has little context so it is difficult to ascribe any ‘programmatic’ motivation behind the laws.³⁶³ However, I argue that the soil might have been ‘unfruitful’ in regard to its ability to grow high-value wheat – as described by Ober.³⁶⁴ Solon, by encouraging fathers to teach their sons a trade, thus, ensures that Athens has products to export in order to import subsistence crops; products such as pottery which, as Johnston and Jones have shown, was likely an Athenian export alongside oil in the seventh century.³⁶⁵ This demonstrates the interconnected nature of the Athenian environment and the legislation of Solon. Solon was aware of the limitations of the Athenian environment, perhaps not in the sense of macro-economic theory of comparative advantage, but certainly enough to know that grain needed to be imported and available at affordable prices to mitigate the threat of famine. This helps to justify the use of a NIE framework to prove the relationship between the environment and the development of the ancient world.

According to Lyttkens, the most ‘important’ political change under Solon was the ‘substitution of wealth for [aristocratic] birth’ as the main criterion for holding political office.³⁶⁶ Lyttkens suggests that this was an attempt to limit the threat of wealthy non-elites organising against the state and the aristocrats. Solon is also reputed to have created the ‘probouleutic’ council of 400, which limited the power of the Assembly, maintaining a portion of the elite’s influence.³⁶⁷ Whilst it is unclear as to whether this change was indeed introduced by Solon it is nonetheless tempting to accept the creation of the council of the 400 as part of Solon’s reforms. The council, which would have had a heavily elite presence, could substantiate Lyttkens’s suggestion that Solon’s legislative motive was maintaining elite power whilst mitigating the desire for revolt. However, Canevaro has questioned whether this situation of ‘*stasis*’ was in fact Solon’s rhetorical diagnosis of the effects of ‘*koros, hybris, and injustice*’.³⁶⁸

³⁶¹ [Aristotle] *Ath. Pol.* XII.3.

³⁶² Canevaro 2022: 389-390.

³⁶³ Canevaro 2022: 366.

³⁶⁴ Plutarch *Solon* XXII. Ober 2015: 28.

³⁶⁵ Johnston and Jones: 1978: 140.

³⁶⁶ Lyttkens 2013: 75.

³⁶⁷ Lyttkens 2013: 76.

³⁶⁸ Canevaro 2022: 385.

Thus, we could view the creation of the probouletic council, if it is indeed Solonian, as part of Solon's wider attempts to stabilise the Athenian society and implement justice. I argue this ties in with Solon's wider attempts to stabilise Athenian society by preserving grain prices and domestic agricultural trade. This demonstrates the centrality of the environment within Solon's reforms.

Lyttkens work does usefully split Solon's reforms into both economic and political institutional categories. His work demonstrates the ways in which these two realms were utilised by Solon, and why he might have made the changes he did. For Lyttkens the 'rational-actor perspective' is his preferred method of analysis.³⁶⁹ Whilst I can see the value in Lyttkens method, one of the reasons why NIE is an effective analytical framework is that it allows for multiple reasons for a decision- rational *or* irrational.³⁷⁰ As such, I will note that while his assessment of Solon's motivations is not implausible, it is difficult to justify. Lyttkens suggests, for instance, that Solon stood to profit from his reforms. However, if we accept our ancient sources, Solon travelled to Egypt and Sardis after his reforms were enacted - not to return for 10 years.³⁷¹ Canevaro's view, which suggests Solon's legislation may have truly been intended to stabilise the society, is thus more likely, as Solon's self-induced exile proves that his intention was not personal profit.

Finally, whilst Lyttkens mentions geography in his wider analysis he pays little attention to the environment when discussing Solon. The environment is central to my case study, and I have demonstrated how it can be integrated into a wider NIE framework. As I have discussed above, Williamson splits his analysis into four levels, with a fifth zero level which operates above them. I argue that in the context of the development of Athenian history, the human-created environment is one of these zero level institutions and is deeply important to our understanding of how the economy developed in the way that it did. The human-created environment, as part of the zero level, influences each subsequent economic and non-economic institution, from religion, to the laws and governance structures, to the market.

Overall, this case study has looked at instances where the olive operates at the different institutional levels of NIE analysis, from non-economic to economic institutions and through

³⁶⁹ Lyttkens 2013: 72.

³⁷⁰ Bresson 2016a: 16 on *Homo-economicus*.

³⁷¹ Herodotus *Hist.* 1.30. See also Plutarch *Solon.* 25.5.

the legislation of Solon and laws recorded in Lysias. This shows how the environment can be an influence at each different level of NIE analysis. Whilst scholars, such as Manning, are keen to point to specific environmental events such as volcanic eruptions in non-Mediterranean countries including Iceland and Alaska causing ‘reductions in Nile River water’ and thus resulting in ‘socioeconomic stress’ in Egypt, I have aimed to show how it is a more holistic influence which covers both economic and non-economic institutions.³⁷² It is not just the amount of food sold in the market and the price of those foods, but the naming myths, the religious beliefs, the laws, and governance structures, which are deeply impacted by the environment and *vice versa*. I combine these ideas together in my framework below.

3.5 Analysis using my Framework

I have outlined how ancient historians have used NIE and Oliver Williamson’s framework for undertaking institutional analysis. Using their work, I put forward a new framework which can be applied to the ancient Greek world (fig. 3 in appendix p.76). My case study, thus far, has focussed on the olive, arguing the olive is a key part of the human-created environment and tracing its institutional importance through non-economic and economic institutions alike. This is significant as it supports my assertion that the human-created environment should be considered part of the ‘zero level’ of any framework which aims to accomplish a NIE analysis of the ancient world.³⁷³ Whilst the impact of the environment on the economy has received some attention (as indeed shown by the fact that Manning calls the environment and the economy ‘two sides of the same coin’), my approach situates the human-created environment formally as an institution within a framework.³⁷⁴ This allows me to pay close attention to the non-economic levels of institutional analysis as well as the economic levels.

In the following section, I use the collected evidence from my case study to demonstrate how the olive can be situated within a NIE framework. This will prove that the environment belongs in the zero level, due to its impact on the subsequent levels, and for its importance in the legislation of Solon and the law recorded in Lysias 7. Subsequently, this thesis seeks to marry the environment and the economy in an innovative way which mirrors the interconnectedness of the two areas. I will do this by discussing every level of the framework,

³⁷² Manning 2020: 170.

³⁷³ Williamson 2000: 600.

³⁷⁴ Manning 2020: 143.

what is contained within each level, the purpose of the level, and how the olive (and thus the human-created environment) fits in.

3.5.1 Zero level

The zero level was suggested by Williamson to integrate the findings of the developmental psychologist Steven Pinker into a pre-cultural institutional level.³⁷⁵ Pinker's work inspired Williamson to consider the extent to which culture is truly the first level of institutions. In Williamson's eyes, developmental psychology fits in as an institution which shapes the first level of culture. I agree that human neurological development could be in the zero level, for its impact on the first level of cultural embeddedness. However, Williamson does not place the environment within his framework. Without discussing human psychological development, which is not the subject of this investigation, I would suggest that the environment plays a role in this zero level. As I have stated, the environment is both the planet's 'natural' ecology and the 'human-created' environment chosen for cultivation or habitation - with the 'human-created' aspect being an institution.³⁷⁶ Implementing the human-created environment at the zero level allows us study 'the relations of culture, technology and nature' throughout different periods, as environmental history does, but it also allows us to trace its impact on the economy more broadly.³⁷⁷ The environment changes the societies who inhabit it, and is, in turn, slowly changed by generations of humans who decide which plants to cultivate or which natural harbours can become major ports. Thus, we can see how the environment, especially the human-created environment, has a significant relationship with other institutions and is also subject to institutional feedback.

In the case study, I examined how my framework can be used to explain certain events which impact the Athenian economy such as Solon's legislation or the sanctification of *morai*. Through the lens of Williamson's framework, we can see how the Athenian economy is shaped by the cultural, legal, and governance institutions in the first, second, third, and fourth institutional levels. I argue that the Athenian economy and its institutions are impacted by the human-created environment, thus, justifying its placement, at the beginning of the framework, in the zero level.

³⁷⁵ Williamson 2000: 600. Pinker 1997.

³⁷⁶ Merchant 2012: 1.

³⁷⁷ Ibid.

Two examples of human-created environmental institutions are: the development of *moriai* groves, and the Greek ‘ecological niche’- the ideal chosen environment for *poleis*.³⁷⁸ This ecological niche exists within the olive limit which is the boundaries of the olive’s ideal growing conditions (see map in fig. 4 in appendix p.77). Despite this, the olive was not as culturally ubiquitous in other *poleis* as it was with Athens.³⁷⁹ Thus, there must also be more nuanced micro-regional environmental conditions and cultural differences which impact this. Two such micro-regional conditions are altitude and soil conditions. For example, the soil conditions and altitude of the Acropolis in Athens supports the growth of an olive tree as it still does today. This could shed light on the origin of the naming myth discussed above and the account by Herodotus about the magical regeneration of the olive stump after the Persian wars.³⁸⁰ As olives can survive rich or poor soils, the Acropolis’ soil conditions may have supported wild olives, or an olive tree of considerable age, when the myth was first established.³⁸¹ The question of the origin of such a tree thus plays a part in the cultural imaginary. Connecting the tree to Athena and institutionalising the *moriai* as protected religious property influenced the perceived value of their oil. The regeneration of the stump also plays into this religious connection despite being a result of the resilience of olive trees - which can survive some burning, if their roots are strong allowing a new shoot to grow.³⁸² This demonstrates how the natural environment (e.g., soil conditions) can become part of the human-created environment (e.g., the Greek ecological niche) and how this can influence other institutional levels (e.g., religion and culture) which then impact neoclassical economic factors (e.g., olive oil prices).

No institution exists in a vacuum. Therefore, every institution influences, or is influenced by, other institutional levels within the framework. This relationship of reciprocal influence can be categorised as institutional feedback. One way to view this feedback within at the human-created environment is by looking at how olives are grown. For instance, young olives require regular watering.³⁸³ The availability of water is a predominantly natural phenomenon; however, it is likely that water is being irrigated from another source.³⁸⁴ This

³⁷⁸ Ober 2015: 26.

³⁷⁹ As we have seen from Papazarkadas 2011 on the sanctity of Attic olives.

³⁸⁰ Herodotus *Hist.* 8.55. Also, Carey 2012: 249.

³⁸¹ Bresson 2016a: 128.

³⁸² Papazarkadas 2011: 262. Pliny *Natural History* 17.242 ‘*oliva in totum ambusta revixit*’. Also, Carey 2012: 249.

³⁸³ Foxhall 2007: 101-102. See also Theophrastus *CP* 3.8.

³⁸⁴ Foxhall 2007: 71-72 on irrigation in the Greek world.

constitutes a form of human manipulation of the environment. This human-created environmental phenomenon fits at the zero level, but the action of irrigation also demonstrates inter-institutional feedback. Perhaps this irrigation is part of a community effort, demonstrating second or third level behaviour of institutional cooperation and governance, although this irrigation could be part of a private effort to increase yield for profit. In this case, it can be linked to the fourth level behaviour of supply, demand, and profit maximisation. If this profit maximisation is successful then it may lead to the planting of more olive trees – a human-created environmental action.

3.5.2 Level One

In Williamson's framework level one contains embedded cultural factors.³⁸⁵ These embedded cultural factors are the informal institutions of society, such as religion, traditions, norms, and customs. The olive, as part of the human-created environment, influences many of these categories. Level one factors are specific to each culture and period that is analysed, thus, Williamson did not include myths in his framework. I have integrated myths into my framework at this level as they express Athenian ideas of self-identity. If we return to the naming myth of Athens, Athena gifts the Athenians an olive tree from which all *moriai* are propagated.³⁸⁶ This demonstrates the centrality of the olive to the Athenian cultural imaginary; the olive is deeply connected to the name Athens itself. From another perspective, the rejection of Poseidon's gift of a saltwater spring could also be related to the olive as it, like other plants, cannot be irrigated with saltwater. This may add another dimension to the importance of the cultivated environment in ancient Athens.

The level one institution of religion sees significant institutional feedback between it and the human-created environment. The 'natural' ecosystem would dictate whether olives grow well in a certain area but the deliberate selection and alteration of this territory, the Greek 'ecological niche', becomes 'human-created' because it is chosen for its specific attributes.³⁸⁷ The religious importance ascribed to olives, in these territories, encouraged more 'human-created' agricultural environments; for example, the grove of sacred olive trees that existed in the Academy.³⁸⁸ Furthermore, in Herodotus, as I discussed above, the Epidaurians are told to

³⁸⁵ Williamson 2000: 597.

³⁸⁶ Herodotus *Hist.* 8.55.

³⁸⁷ Merchant 2012: 1. Ober 2015: 26.

³⁸⁸ Merchant 2012: 1. Papazarkadas 2011: 264.

make the statues of Damia and Auxesia out of the wood of the ‘cultivated olive’ (ἡμέρης ἐλαίης) which is specifically part of the human-created environment rather than from a wild tree.³⁸⁹ This religious significance of the olive may have encouraged further ‘human-created’ cultivation of the Athenian environment – representing inter-institutional feedback.³⁹⁰

3.5.3 Level Two

I have demonstrated that the institution of the human-created environment impacts the first level of institutional analysis in my framework. It also influences the second level, defined as the formal rules of the game, in which Williamson includes property, matters of polity, judiciary, and bureaucracy.³⁹¹ In my framework, I have also chosen to include the institutions of slavery, *polis* citizenship, and coinage. These are not mentioned by Williamson as they are not considerations for modern historians or economists; however, analysis of the Athenian *polis* requires the addition of these institutions. To answer the question of how the olive fits into this framework, I split the influence of the olive into two sections, which both reside in the second level: the legal and the numismatic. In the legal level I have included the legislation of Solon which limited all exports bar olive oil and the case of Lysias 7 which concerns the alleged removal of an olive-stump. I have shown that Solon’s legislation was likely aimed at stabilising Athenian society and did not attempt to increase the value of Athenian oil *per se*; however, it does demonstrate how the environment and the olive influences legislation, just as it does in Lysias 7. Moreover, the olive influenced Athenian coinage by its inclusion on the recognisable device on the reverse of Athenian drachma alongside the emblematic owl, AΘE legend, and lunar crescent.³⁹² Scholars have connected this symbolism to the Panathenaic festival as well as the wider significance of the olive in Athens.³⁹³ The quality of Athenian silver from Laurion, also influences the ubiquity of the Athenian drachma, but as Tai Engen discusses, the Law of Nikophon, which introduced *dokimastai* coin-quality czars to the *agora*, truly maintained the strength of the Athenian currency.³⁹⁴

In both the legal realm and the numismatic realm, the olive can be seen to influence level two institutions. In Tai Engen’s discussion, we can see how the recognisable device used

³⁸⁹ Herodotus *Hist.* 5.82.

³⁹⁰ Merchant 2012: 1.

³⁹¹ Williamson 2000: 597.

³⁹² Tai Engen 2005: 363.

³⁹³ Anghelina 2017: 175-183. Papazarkadas 2011: 260.

³⁹⁴ Tai Engen 2005: 369.

on Attic coinage, to represent Athens, helped maintain its value and increase the influence of the Athenian *polis* – this device included an olive sprig.³⁹⁵ Furthermore, both the legal institutions of Solon and the law recounted in Lysias demonstrate just how influential the religious sanctity of the *moriai* were. This establishes the importance of the *moriai*, and thus, the human-created environment in shaping the level two institutions. There is also a link between private, and state property to be made with regards to *moriai*. *Moriai* were, as Papazarkadas suggests, property of Athena herself, so we must consider that any land on which *moriai* stood, also had a unique connection to the state and to religion and was not private property in the modern sense.³⁹⁶ It is this religious ownership that warranted the oil levy which was collected for the Panathenaic prize.³⁹⁷

3.5.4 Level Three

The third level of governance is closely linked with the second legal level, as the governance structures implement, and are subject to, laws - demonstrating ‘feedback’.³⁹⁸ Solon's prohibition of all agricultural exports minus olive oil, can be seen as both a legal and governmental attempt to stabilise Athenian society. Banning the exportation of wheat and barley out of the *polis* meant that more produce could be consumed domestically, thus, mitigating the risk of food shortages. Although the specialisation into the exportation of olive oil was not the aim of Solon's legislation, the high price and religious significance of Athenian oil may have allowed Athenians to profit from oil exports. Therefore the Athenians could import more grains to supplement the crops they could grow in Attica, thus further reducing the threat of famine. As I have discussed, the prohibition law itself is a second level institution but when combined with Solon's governmental legislation, including the probouleutic Council of 400, we can see how Solon attempted to stabilise Athenian society.

Transaction costs and contracts are key elements of level three institutional analysis and the olive trade allows us to view instances of both. One benefit to olive oil being the only Athenian export product was that it could be shipped out of the *polis* in amphorae and those same amphorae could later be used to import fish or wine.³⁹⁹ This undoubtedly lowered

³⁹⁵ Tai Engen 2005: 363. See also van Wees 2013: 125-126 and his discussion of Hippias's new coinage in exile at Sigeum which is identical to the Athenian device - minus the olive sprig.

³⁹⁶ Papazarkadas 2011: 261.

³⁹⁷ Papazarkadas 2011: 263.

³⁹⁸ Williamson 2000: 596.

³⁹⁹ Bresson 2016a: 186.

transaction costs as the amphorae could be reused.⁴⁰⁰ The expansion of oil exports, and olive cultivation, also directly benefitted the Athenian *polis*, as the archon (later the treasury) collected three-quarters of a pint of oil from each *moriai*, and later each tree which grew on the same plot as a *moriai*.⁴⁰¹ The high status attached to Athenian oil abroad increased its value and its price rose further when it was awarded as a prize at the Panathenaic Games. Over time, the rise in the value of oil decreased the average transaction price percentage cost as profit increased.⁴⁰² As Bresson suggests, another benefit is that amphorae could be easily stacked and this organisation of the cargo meant the ship was more stable.⁴⁰³ This means ships carrying amphorae were less likely to sink. In turn, this could have encouraged amphorae transportation which may have further decreased transaction costs.

3.5.5 Level Four

This brings us to level four, the neoclassical economic level, which is where orthodox economic analysis can take place. This includes the supply and demand of olives and olive paraphernalia, which may include amphorae, oil jugs, oil lamps, strigils, and perfume – essentially all products which can be produced from, or complement, olives. Once more, this ties into Foxhall’s point that the value of olive products was determined by the elaborate nature of the processes which create the product (or the demand for that product).⁴⁰⁴ For example, table olives were the cheapest olive product but the processing of olives into oil or as an ingredient in perfume increased their cost. Foxhall’s work is thoroughly useful for this level of analysis. Williamson states this level contains resource allocation and employment. While we may not be able to trace many instances of employment connected to olives, there were the ambiguous men recorded in Lysias ‘who bought the produce of the sacred olives’.⁴⁰⁵ These men may have been connected with the state, and licensed the right to make a commercial sacred oil. Perhaps, a certain number of sacred olives were retained and sold as table olives. It is even tempting to suggest a luxury market existed for gymnasium oil or perfume made from the *moriai* olives which mirrors the fine oil collected from the oleaster variety.⁴⁰⁶ These are questions we can raise; however, it is difficult to answer them definitively.

⁴⁰⁰ Pratt 2015: 231.

⁴⁰¹ [Aristotle] *Ath. Pol.* LX.1-3.

⁴⁰² Bresson 2016a: 80 ‘The unit of transport cost is inversely proportional to the unit value per unit of weight and volume’.

⁴⁰³ Bresson 2016a: 126.

⁴⁰⁴ Foxhall 2007: 258, 260.

⁴⁰⁵ Lysias 7.2-3.

⁴⁰⁶ Bresson 2016a: 128.

Williamson includes prices and quantities as well as incentive alignment in the fourth level. The ‘high value’ of olive oil, especially the renowned Athenian oil, must have played a part in the incentive to grow olives for land owners.⁴⁰⁷ I have included the *agora*, the *emporion*, and consumer culture at this level. I also differentiate my framework from Williamson’s as I have not included a free market. It is difficult to suggest whether the market was free in the ancient world. To an extent, people were free to set their own prices and some market mechanics, such as supply based pricing, must have operated. However, I refrain from calling the *agora* a truly free market because the *polis*, and the *agoranomoi*, had too much influence over transactions. Additionally, as I have already discussed, no agricultural product other than olive oil could be exported under Solon. Another thesis could be dedicated to answering the question of whether a free market existed in the ancient world, but rather than argue for either position, I prefer to exclude the free market from my framework.

I have argued throughout this investigation that by tracing the impact of the olive we can see the significance of the environment within the development of the Athenian economy. The plethora of feedback between each inter-institutional level demonstrates just how connected this framework is, which proves the utility of NIE analysis. NIE allows us to zoom into different institutions and evaluate not only their significance but also the ideas which have shaped them. This truly demonstrates the value in using NIE to approach the Athenian economy. It elucidates the non-economic institutions which greatly enhance our understanding of how Athenian institutions developed and the impact the environment had on these Athenian institutions. It is well accepted that the olive was an important product and symbol in ancient Athens. However, NIE analysis supplies the necessary tools to demonstrate why and how the olive is significant to Athens and to the Athenian economy. By situating the ‘human-created’ environment in the zero level, I was able to fully utilise the benefits of a NIE framework, and demonstrate the environment’s significance within the ancient economy.

4. Conclusion

Overall, this thesis has proposed a new method to consider the environment in NIE by placing the ‘human-created’ environment as an institution in the zero level of a NIE framework. I have argued that by assessing the inter-institutional impact of the olive on Athenian life we can better understand the role the environment played in shaping Athenian institutions. I have offered an

⁴⁰⁷ Ober 2015: 152.

answer to the question, raised by current approaches in scholarship, of how we can assess the impact of the environment on both economic and non-economic institutions simultaneously. Furthermore, I have developed a new and relevant framework by building on the scholarship of Oliver Williamson in NIE and by developing the ideas Alain Bresson and J. G. Manning in their study of the ancient economy. Bresson and Manning by no means neglected the environment in their analysis; however, their frameworks did not cohesively integrate the environment in a way which allowed for the analysis of its connection to non-economic institutions such as religion. While existing frameworks are useful, I have argued that scholarship can benefit from looking at the human-created environment at the zero level of a NIE framework as it can demonstrate the environment's influence on more than the traditionally studied areas of demography, supply, demand, and pricing.

I illustrated the applicability of the framework to the ancient world by focussing on the role of the olive in the Athenian economy. I examined the Athenian environment drawing on Lin Foxhall whose work on the relationship between the olive and the economy is thoroughly useful although it does not employ a NIE analysis. Despite the lack of extant evidence for the Athenian production of olive oil, I demonstrated that the stratification of amphorae and the extant literary sources argue in favour of an olive oil export economy in Athens which preceded Solon. This export economy continued during Solon's archonship and in the centuries following his legislation - with the exportation of Panathenaic victors' oil. This oil was made from, *moriai* sacred olive trees in Attica, which are believed to have originated from the gift Athena bestowed upon Athens in the naming myth. I have argued that this sanctification of the *moriai* is a clear demonstration of the institutionalisation of Athenian religious beliefs which were shaped by the human-created environment. I also demonstrated how the institutionalisation of the *moriai* in Athens affects other levels of institutional analysis by discussing the legal dispute recorded in Lysias 7. Furthermore, Solon's legislation attempted to stabilise Athenian society and utilised the Athenian environment to achieve this. For instance, Solon prohibited all agricultural exports except olive oil. This prevented famine and perhaps even helped grow the Athenian economy. This demonstrates why the environment should not be overlooked when assessing Athenian institutions.

This research makes a new contribution to existing approaches; however, it might be further developed by considering other plants and natural phenomena, which could be traced from the zero level to the fourth. A similar study could be conducted to judge the influence of

grapes and wine on the Athenian economy. The impact of the silver mines at Laurion could also be a fruitful avenue for discussion. Future scholarship may also assess the impact of the environment on the institutions of other *poleis* such as Sparta or Thebes. These types of investigations could shed further light on the complexity of the ancient economy, helping us to better understand both how the Greek economy operated and how the environment played a part.

The disciplines of environmental history and NIE are vital to our understanding of how the ancient world developed. The case study of the olive, Athena's tree, demonstrates why a holistic approach, which integrates economic and environmental study together, should be taken to fully understand the consequences of each institutional level. The zero level is an especially useful tool for understanding the deeply embedded, yet highly significant, environmental factors which I have shown have ramifications in both the economic and non-economic institutional realms.

Appendix

Figure 1: *Alston's Diagram of Institutional Relationships* from Alston, L. J. 2008. 'New Institutional Economics' in S. N. Durlauf and L. E. Blume eds. *The New Palgrave Dictionary of Economics* (London: Palgrave Macmillan). p. 2.

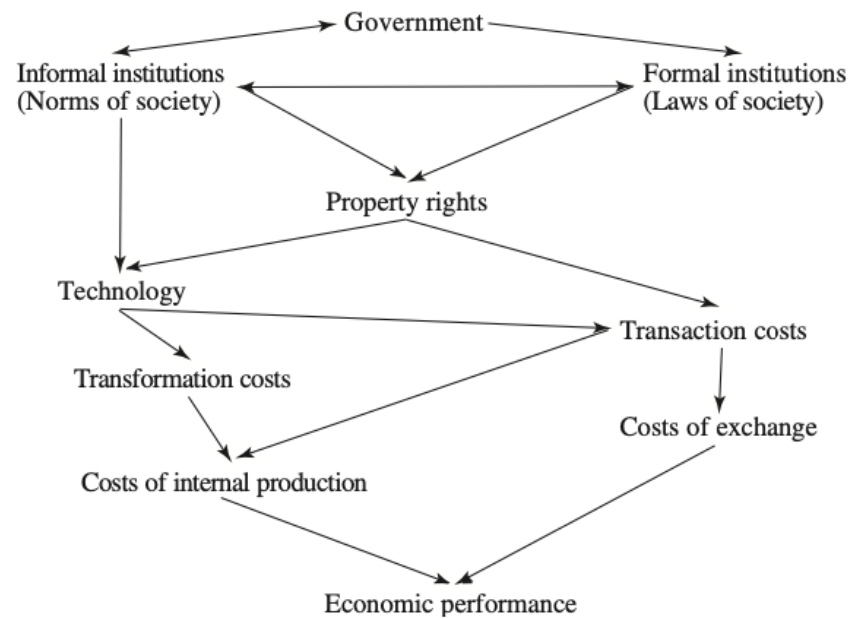
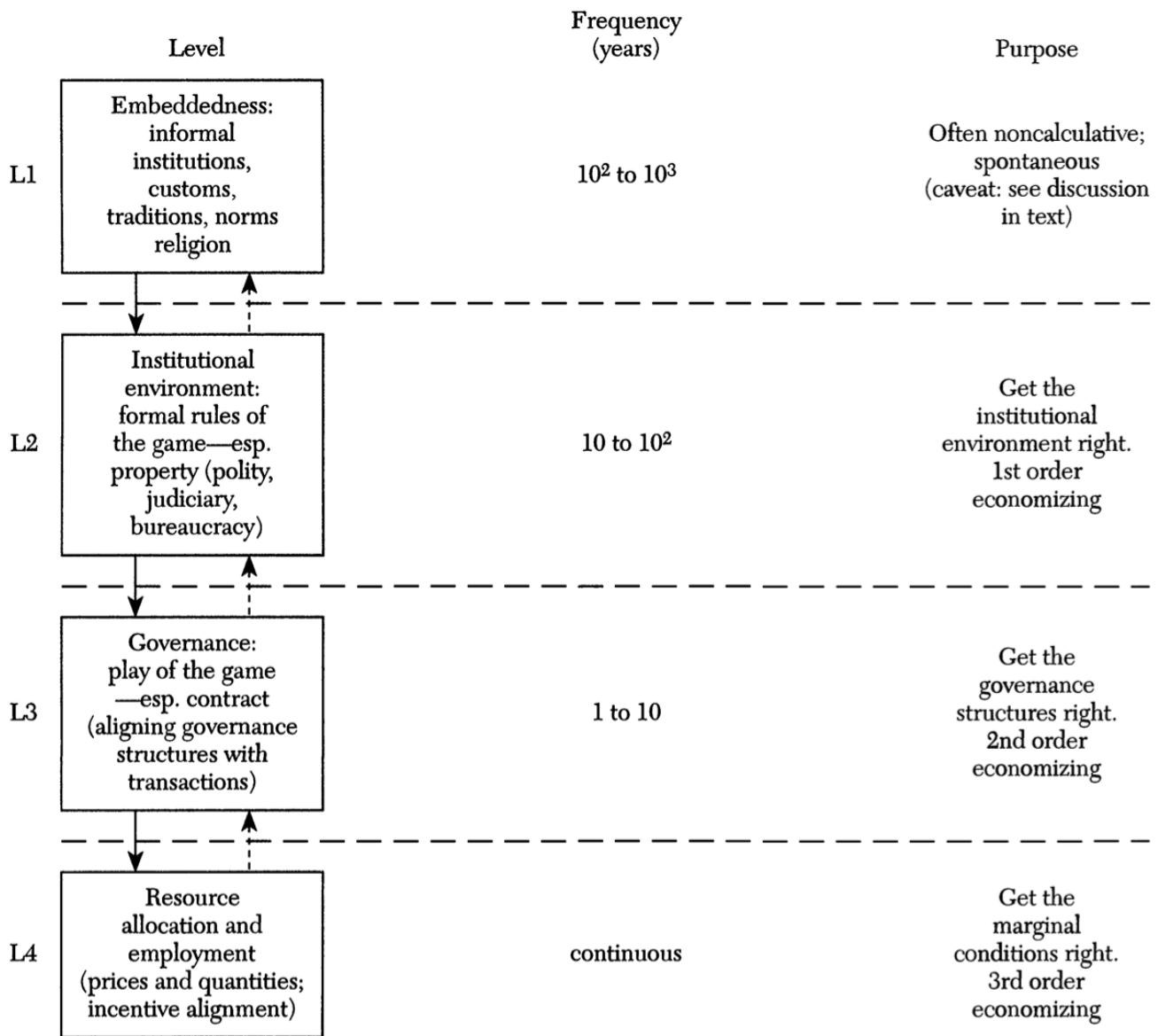


Figure 2: *Williamson's Table of Institutions* from Williamson, O. 2000. 'The New Institutional Economics: Taking Stock, Looking Ahead' in *Journal of Economic Literature* Vol. 38, No. 3. p. 597.

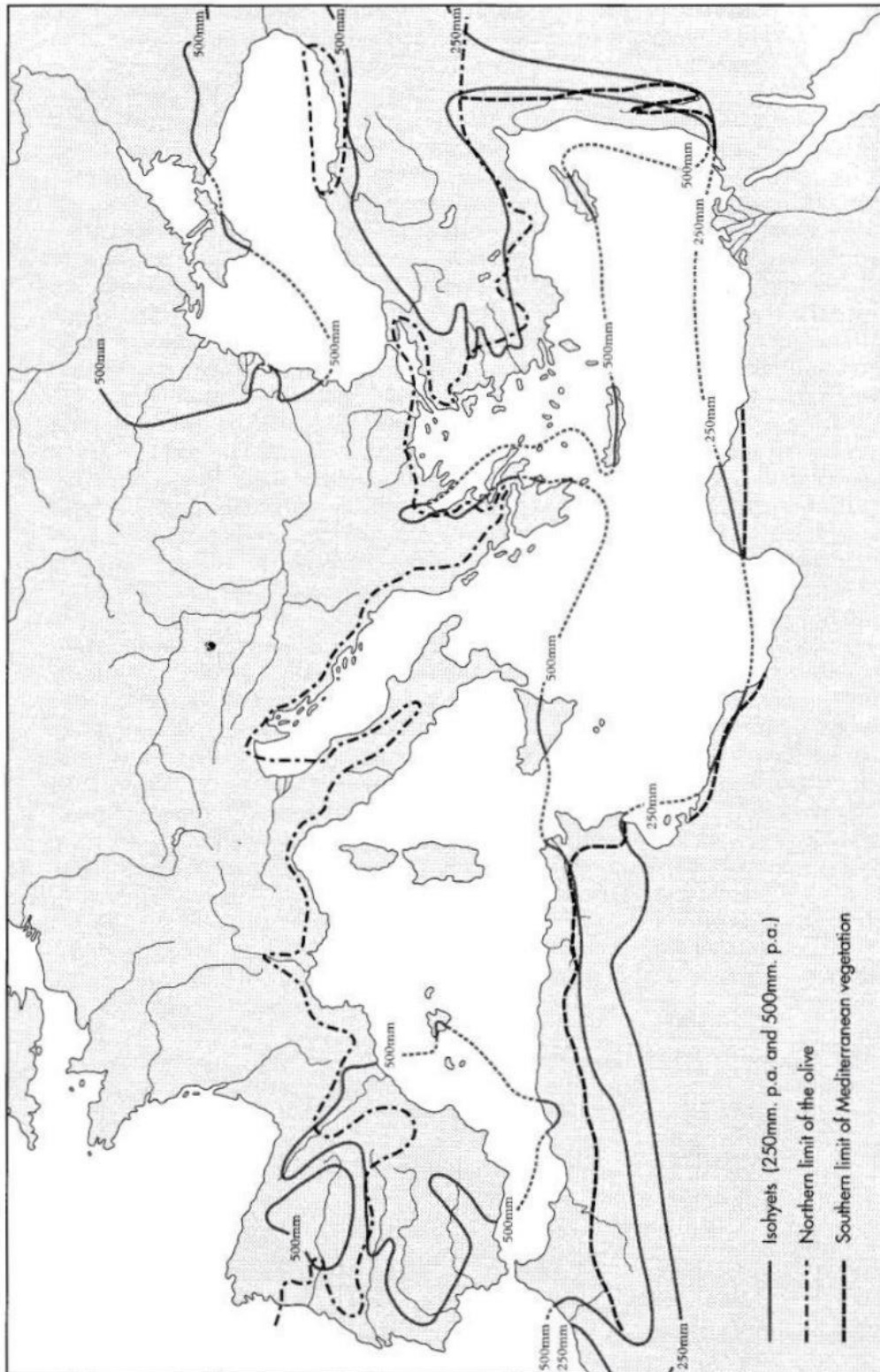


L1: social theory
 L2: economics of property rights/positive political theory
 L3: transaction cost economics
 L4: neoclassical economics/agency theory

Figure 3: *My Framework of Institutions and their Relationships.*

Level	Description	Ancient Examples	Purpose
0	Inherent conditions: the human-created environment, survival requirements, human mind, and language.	This includes the human-created environment – the Greek ecological niche, geography, resources, and access to sea, etc. Language and Psychological development are included here.	The most basic preconditions of human development
1	Embeddedness: informal institutions, customs, traditions, norms, religion.	Here is religion and myth, including the institutions of sanctuaries.	Perhaps non-calculative; spontaneous. Certainly hyper specific and culturally dependent.
2	Institutional Environment: Formal rules of the game – especially property. Also Polity, Judiciary, and Bureaucracy.	The institutional environment includes the <i>polis</i> which dictates the judiciary and bureaucracy which Williamson mentions but also slavery, citizenship, and coinage.	The Institutional Environment. 1 st order economising.
3	Governance: The play of the game. Especially regards contracts and the aligning of governance structure with transactions.	Included here are <i>polis</i> institutions which monitor the economic activity and governance. <i>Xenia</i> could also apply here.	The governance structures. 2 nd order economising.
4	Resource allocation and employment. Prices and quantities. Incentive alignment.	The <i>agora</i> and the <i>emporion</i> . Consumer culture.	Get the marginal conditions right. 3 rd order economising.

Figure 4: *Map of the Olive Limit.* in Horden, P. and Purcell, N. 2015. *The Corrupting Sea: A Study of Mediterranean History* 2nd Edition (Oxford: Blackwell). p.14.



Bibliography

Ancient

- Aristotle. 2015. *Athenian Constitution: Eudemian Ethics; Virtues and Vices* trans. by H. Rackham (Cambridge, MA: Harvard University Press).
- Demosthenes. 1930. *20. Against Leptines in Orations, Vol. 1. 1-20.* trans. by J. H. Vince (Cambridge, MA: Harvard University Press).
- , 2014. *34. Plea of Chrysippus against Phormio in Orations, Vol. 4. 27-40.* trans. by A. T. Murray (Cambridge, MA: Harvard University Press).
- , 2014. *35. Androcles against Lacritus in Orations, Vol. 4. 27-40.* trans. by A. T. Murray (Cambridge, MA: Harvard University Press).
- Diogenes Laertius. 2015. *Lives of Eminent Philosophers* trans. by R. D. Hicks (Cambridge, MA: Harvard University Press).
- Herodotus. 2003. *The Histories* trans. by A. De Sélincourt revised with Introduction and Notes by J. Marincola (London: Penguin Books).
- Homer. 2014. *Iliad* trans. by A. T. Murray & W. F. Wyatt (Cambridge, MA: Harvard University Press).
- , 2015. *Odyssey* trans. by G. E. Dimmock & A. T. Murray (Cambridge, MA: Harvard University Press).
- Lysias. 2015. *VII: Before the Areopagus: Defence in the Matter of the Olive Stump in Lysias* trans. by W. R. M. Lamb (Cambridge, MA: Harvard University Press).
- , 2015. *XXII: Against the Corn-Dealers in Lysias* trans. by W. R. M. Lamb (Cambridge, MA: Harvard University Press).
- Plato. 2015. *Critias in Timaeus; Critias; Menexenus; Epistles.* trans. by R. G. Bury (Cambridge, MA: Harvard University Press).
- , 2017. *Phaedo.* trans. by C.J. Emlyn-Jones and W. Preddy (Cambridge, MA: Harvard University Press).
- Pliny. 2015. *Natural History* trans. by H. Rackham (Cambridge, MA: Harvard University Press).
- Solon. 2015. *Fragments in Greek Elegiac Poetry: From the Seventh to the Fifth Centuries B.C.* trans. by D. E. Gerber (Cambridge, MA: Harvard University Press).
- Theophrastus. 2015. *De Causis Plantarum (CP)* trans. by B. Einarson & G. K. K. Link (Cambridge, MA: Harvard University Press).

Modern

- Alston, L. J. 2008. 'New Institutional Economics' in S. N. Durlauf and L. E. Blume eds. *The New Palgrave Dictionary of Economics* (London: Palgrave Macmillan).
- Anghelina, C. 2017. 'Athena's Birth on the Night of the Dark Moon' in *The Journal of Hellenic Studies* Vol. 137. pp. 175-183.
- Arrow, K. J. 1987. 'Reflections on the Essays' in *Arrow and the Foundations of the Theory of Economic Policy* ed. by G. Feiwel (New York: New York University Press) pp. 727-34.
- Blok, J. and Lardinois, A. Eds. 2006. *Solon of Athens New Historical and Philological Approaches* (Leiden: Brill).
- Bradley, S. W., Kim, P. H., Klein, P. G., McMullen, J. S. and Wennberg, K. 2021. 'Policy for innovative entrepreneurship: Institutions, interventions, and societal challenges' in *Strategic Entrepreneurship Journal* Vol. 15 pp. 167-184.
- Braudel, F. 1949. *La Méditerranée et le monde Méditerranéen à l'époque de Philippe II*. (Paris: A. Colin).
- . 1972. *The Mediterranean and the Mediterranean World in the Age of Philip II: Vol I*. Trans. by S. Reynolds (Berkeley: University of California Press).
- Bresson, A. 2007. *L'économie de la Grèce des cites (fin Vie-Ier siècle a.C.). I. Les structures et la production*. Collection U. (Paris: A. Colin).
- . 2008. *L'économie de la Grèce des cites (fin Vie-Ier siècle a.C.). II. Les espaces de l'échange*. Collection U. (Paris: A. Colin).
- . 2016a. *The Making of the Ancient Greek Economy; Institutions, Markets, and Growth in the City-States* trans. by S. Rendall; First French Edition Published in Two Vols. 2007 & 2008. (Princeton, NJ: Princeton University Press).
- . 2016b. 'Aristotle and Foreign Trade' trans. by E. M. Harris in *The Ancient Greek Economy; Markets, Households, and City States* eds. By. E. M. Harris, D. M. Lewis, and M. Woolmer (Cambridge: Cambridge University Press). pp. 41-65. First published as Bresson, A. 1987. 'Aristote et le commerce extérieure.' In *R.E.A* Vol. 89. pp. 217-38.
- Broodbank, C. 2000. *An Island Archaeology of the Early Cyclades* (Cambridge: Cambridge University Press).
- . 2013. *The Making of the Middle Sea: A History of the Mediterranean from the Beginning to the Emergence of the Classical World*. (Oxford: Oxford University Press).
- Brüggemeier, F.-J. 2001. 'Environmental History' in N. J. Smelser and P. B. Blates eds. *International Encyclopedia of Social and Behavioral Sciences* (Oxford: Pergamon) pp. 4621-4627.

- Burke, E. and Pomeranz, K. Eds. 2009. *The Environment and World History* (Berkeley, CA: University of California Press).
- Canevaro, M. 2022. 'Social mobility vs. societal stability. Once again on the aims and meaning of Solon's reforms.' In J. Bernhardt, and M. Canevaro eds. *From Homer to Solon: Continuity and Change in Archaic Greece* (Leiden: Brill) pp. 363-413.
- Carey, C. 2012. *Trials From Classical Athens* 2nd Edition. (London: Routledge).
- Chiasson, C. C. 2016. 'Solon's Poetry and Herodotean Historiography' in *The American Journal of Philology* Vol. 137. No. 1. pp. 25-60.
- Christesen, P. 2003. 'Economic Rationalism in Fourth-Century BCE Athens' in *Greece & Rome*, Vol. 50. No. 1. pp 31-56.
- Coase, R. 1937. 'The Nature of the Firm' in *Economica* Vol. 4 No. 16 pp. 386-405.
- , 1959. 'The Federal Communications Commission in *J. Law Econ* Vol. 2. No. 2. pp.1-40.
- Commons, J. R. 1932. 'The Problems of Correlating Law, Economics, and Ethics' in *Wisconsin Law Review* Vol. 8. No. 1. pp. 3-26.
- Cooper, T. 2008. 'British Environmental History' available at: [\[https://archives.history.ac.uk/makinghistory/resources/articles/environmental_history.html\]](https://archives.history.ac.uk/makinghistory/resources/articles/environmental_history.html) [accessed 17.01.2023].
- Costinot, A. and Donaldson, D. 'Ricardo's Theory of Comparative Advantage: Old Idea, New Evidence' in *The American Economic Review*, Vol. 102. No. 3. pp. 453-458.
- Cronon, W. 1983. *Changes in the Land: Indians, Colonists and the Ecology of New England* (New York: Hill and Wang).
- Damodaran, V. 2015. 'Environmental History' in in N. J. Smelser and P. B. Blates eds. *International Encyclopedia of Social and Behavioral Sciences* 2nd Edition Volume 7 (Oxford: Pergamon) pp. 747-755.
- Davies, J. 2017. 'Review of Alain Bresson's, *The Making of the Ancient Greek Economy*' in *The American Historical Review*, Vol. 122. No. 3 pp. 905-906.
- D'Onofrio, M. A. 1997. 'The 7th Century BC in Attica: The Basis of Political Organisation' in H. Damgaard Andersen, H. W. Horsnæs, S. Houby-Nielsen, and A. Rathje eds. *Urbanization in the Mediterranean in the 9th to 6th Centuries BC* (Copenhagen: Museum Tusulanum Press) pp. 63-88.
- , 2019. 'Some Thoughts on the Pre-Classical Athenian Society' in C. Graml, A. Doronzio, and V. Capozzoli eds. *Rethinking Athens Before the Persian Wars – Proceedings of the International Workshop at the Ludwig-Maximilians-Universität München (Munich 23rd-24th February 2017)*. (Munich: Utzverlag) pp.25-39.

- Doronzio, A. 2019. 'A Fresh Look at the Kerameikos Necropolis: Social Complexity and Funerary Variability in the 7th Century BC' in C. Graml, A. Doronzio, and V. Capozzoli eds. *Rethinking Athens Before the Persian Wars – Proceedings of the International Workshop at the Ludwig-Maximilians-Universität München (Munich 23rd-24th February 2017)*. (Munich: Utzverlag) pp.89-101.
- Findlay, R. 1991. 'Comparative Advantage' in J. Eatwell, M. Milgate, and P. Newman eds. *The World of Economics* (London: Palgrave Macmillan) pp. 99-107.
- Finley, M. 1999. *The Ancient Economy Updated Edition with a Foreword by Ian Morris* (Berkeley: University of California Press). First Published as Finley, M. 1973. *The Ancient Economy* (Berkeley: University of California Press).
- Foxhall, L. 2007. *Olive Cultivation in Ancient Greece: Seeking the Ancient Economy* (Oxford: Oxford University Press).
- Fresco, L. O., Geerling-Eiff, F., Hoes, A-C., van Wassenaer, L., Poppe, K. J., and van der Vorst, J. G. A. J. 2021. 'Sustainable food systems: do agricultural economists have a role?' in *European Review of Agricultural Economics*, Vol. 48, No. 4, pp. 694-718.
- Graml, C., Doronzio, A., and Capozzoli, V. 2019. 'Introduction' in C. Graml, A. Doronzio, and V. Capozzoli eds. *Rethinking Athens Before the Persian Wars – Proceedings of the International Workshop at the Ludwig-Maximilians-Universität München (Munich 23rd-24th February 2017)*. (Munich: Utzverlag) pp.11-23.
- Harries, B. 1993. "Strange Meeting": Diomedes and Glaucus in 'Iliad' 6' in *Greece and Rome* Vol. 40 No. 2 pp. 133-146.
- Harris, E. M. 1997. 'A New Solution to the Riddle of the Seisachtheia' in L. Mitchell and P. J. Rhodes eds. *The Development of the Polis in Archaic Greece* (London: Routledge) pp. 103-112.
- 2002. 'Did Solon abolish debt bondage?' in *Classical Quarterly* Vol. 52. pp. 415-430.
- Harris, E. M. and Lewis, D. M. 2016. 'Introduction' in *The Ancient Greek Economy; Markets, Households, and City States* eds. By. E. M. Harris, D. M. Lewis, and M. Woolmer (Cambridge: Cambridge University Press). pp. 1-37.
- Hinsch, M. 2021. *Ökonomik und Hauswirtschaft im klassischen Griechenland* (Stuttgart: Franz Steiner Verlag).
- Horden, P. and Purcell, N. 2015. *The Corrupting Sea: A Study of Mediterranean History* 2nd Edition. First Edition published in 2000. (Oxford: Blackwell).
- Hughes J. D. 2006. 'Global Environmental History' in *What Is Environmental History?* (Malden, MA: Polity Press), pp. 77–86.
- Johnston, A. and Jones, R. E. 1978. 'The 'SOS' Amphora' in *The Annual of the British School at Athens* Vol. 73. pp. 103-141.

- Kroll, J. H. and Waggoner, N. M. 1984. 'Dating the Earliest Coins of Athens, Corinth and Aegina' in *American Journal of Archaeology* Vol. 88. pp. 325-340.
- Kyrikou, S., Kouli, K., Triantaphyllou, M.V., Dimiza, M. D., Gogou, A., Panagiotopoulos, I. P., Anagnostou, C., Karageorgis, A. P. 2020. 'Late Glacial and Holocene vegetation patterns of Attica: A high-resolution record from Elefsis Bay, southern Greece' in *Quaternary International* Vol. 545. pp.28-37.
- Langdon M. K. 2013. 'The Terraces of Atene' in *Petasos* (Leiden: Brill).
- Leão, D. F. and Rhodes, P. J. 2015. *The Laws of Solon; A New Edition with Introduction, Translation and Commentary*. eBook Edition (London: I. B. Tauris & Co.).
- Lendering, J. 2020. Publius Valerius Publicola. Available at: <https://www.livius.org/articles/person/valerius-publicola/> [accessed: 16.01.2023].
- Lewis, J. D. 2006; 2008. *Solon the Thinker: Political Thought in Archaic Athens* (London: Bloomsbury).
- Lewis, D. 2018. 'Behavioural Economics and Economic Behaviour in Classical Athens' in M. Canevaro, A. Erskine, B. Gray and J. Ober eds. *Ancient Greek History and Contemporary Social Science* (Edinburgh: Edinburgh University Press). pp. 15-46.
- Liddell and Scott. 2013. *An Intermediate Greek-English Lexicon* 7th Edition (Cincinnati OH: Martino Publishing).
- Lohmann, H. 1993. *Atene: Forschungen zu Siedlungs- und Wirtschaftsstruktur des klassischen Attika*. (Cologne, Weimar, Vienna: Böhlau).
- Lyttkens, C. H. 2013. *Economic Analysis of Institutional Change in Ancient Greece: Politics, Taxation, and Rational Behaviour* (London: Routledge).
- Manning, J. G. 2020. *The Open Sea: the Economic Life of the Ancient Mediterranean World from the Iron Age to the Rise of Rome* (Princeton, NJ: Princeton University Press).
- Meier, M. 2006. Solon Available at: https://referenceworks-brillonline-com.bris.idm.oclc.org/entries/brill-s-new-pauly/solon-e1116670?s.num=0&s.f.s2_parent=s.f.book.brill-s-new-pauly&s.q=solon [accessed: 16.01.2023].
- Merchant, C. 2012. *Major Problems in American Environmental History: Documents and Essays*. 3rd Edition. (Boston, MA. Wadsworth).
- Mitchell, T. N. 2019. *Athens: A History of the World's First Democracy* (New Haven: Yale University Press).
- Morris, I. 1999. 'Foreword' in M. Finley *The Ancient Economy Updated with a new foreword by Ian Morris* (Berkeley: University of California Press).

- Morris, I. 2002. 'Hard Surfaces' in Cartledge, P. Cohen, E. E. and Foxhall, L. eds. *Money, Labour, and Land: Approaches to the Economies of Ancient Greece* (London: Routledge) pp. 8-43.
- . 2004. 'Economic Growth in Ancient Greece' in *Journal of Institutional and Theoretical Economics (JITE)* Vol. 160 No. 4 pp. 709-742.
- Nafissi, M. 2005. 'Ancient Athens & Modern Ideology. Value, Theory and Evidence in Historical Sciences: Max Weber, Karl Polanyi & Moses Finley' in *Bulletin of the Institute of Classical Studies Supplement* 80 pp. xii + 325.
- North, D. 1981. *Structure and Change in Economic History* (New York: Norton).
- . 1991. 'Institutions' in *Journal of Economic Perspectives* Vol 5. No. 1. pp. 97-112.
- Ober, J. 1989. *Mass and Elite in Democratic Athens* (Princeton, NJ: Princeton University Press).
- . 2008. *Democracy and Knowledge*. (Princeton, NJ: Princeton University Press).
- . 2010. 'Wealthy Hellas' in *Transactions of the American Philological Association (1974-2014)* Vol. 140, No. 2. pp. 241-286.
- . 2015. *The Rise and Fall of Classical Greece*. (Princeton, NJ: Princeton University Press).
- . 2017. 'Review of Alain Bresson's, *The Making of the Ancient Greek Economy*' in *Historische Zeitschrift* Vol. 305 pp. 490-492.
- . 2022. *The Greeks and the Rational: The Discovery of Practical Reason* Sather Classical Lectures Vol. 76. (Oakland, CA: University of California Press).
- Observatory of Economic Complexity 2022a: 'Olive Oil' [available at: <https://oec.world/en/profile/hs/olive-oil>] [accessed 15.12.2022].
- 2022b: Olive Oil [available at: <https://oec.world/en/profile/hs/olive-oil>] [accessed 15.12.2022].
- Oxford Classical Dictionary 4th Edition available at: <https://oxfordre.com/classics/fileasset/images/ORECLA/OCD.ABBREVIATIONS.pdf> [Accessed 20.01.2023].
- Paavola, J. & Adger, W. N. 2002. 'New Institutional Economics and the Environment: Conceptual Foundations and Policy Implications' in *CSERGE Working Paper EDM* Vol. 2 No. 6 pp. 1-31.
- Papazarkadas, N. 2011. *Sacred and Public Land in Ancient Athens*, Oxford Classical Monographs (Oxford: Oxford Academic).
- Pinker, S. 1997. *How The Mind Works* (New York: W. W. Norton).

- Pratt, C. E. 2015. 'The 'SOS' Amphora: An Update' in *The Annual of the British School at Athens* Vol. 110. pp. 213-245.
- Raaflaub, K. A. 2006. 'Athenian and Spartan *Eunomia*, or: What to do with Solon's Timocracy' in Blok, J. and Lardinois, A. Eds *Solon of Athens New Historical and Philological Approaches* (Leiden: Brill) pp. 390-428.
- Rasheed, M. & Auffret, T. 2017. 'On the Inauthenticity of the "Critias"' in *Phronesis* Vol. 62. No. 3. pp. 237-254.
- Rhodes, P. J. 1981;1993. *A Commentary on the Aristotelian Athenian Politeia* (Oxford: Oxford University Press).
- . 2006a. 'The Reforms and Laws of Solon: An Optimistic View' in Blok, J. and Lardinois, A. Eds. *Solon of Athens New Historical and Philological Approaches* (Leiden: Brill). pp. 248-60.
- . 2006b. Zeugitai available at: <https://referenceworks-brillonline-com.bris.idm.oclc.org/entries/brill-s-new-pauly/zeugitai-e12216780#> [accessed 16.01.2023].
- Sallares, R. 2007. 'Ecology' in Scheidel, W., Morris, I., and Saller, R. P. eds. *The Cambridge Economic History of the Greco-Roman World*. (Cambridge: Cambridge University Press) pp. 13-37.
- Scheidel, W., Morris, I., and Saller, R. P. eds. 2007. *The Cambridge Economic History of the Greco-Roman World*. (Cambridge: Cambridge University Press).
- Shear, J. L. 2001. *Polis and Panathenaia: The History and Development of Athena's Festival* PhD Dissertation (Pennsylvania: University of Pennsylvania).
- Smelser, N. and Swedberg eds. 1994. 'Introduction' in *The Handbook of Economic Sociology* (Princeton, NJ: Princeton University Press).
- Soll, J. 2022. *Free Market; The History of an Idea* (New York: Basic Books).
- Tai Engen, D. 2005. "'Ancient Greenbacks": Athenian Owls, the Law of Nikophon, and the Greek Economy' in *Historia: Zeitschrift für Alte Geschichte* Vol. 54. No. 4. pp. 359-381.
- Urbainczyk, T. 2006. 'Review of Nafissi M. Ancient Athens & Modern Ideology' in *The Classical Review* Vol. 56. No. 2 pp. 396-398.
- van Wees, H. 2006. 'Mass and elite in Solon's Athens: the property classes revisited' in Blok, J. and Lardinois, A. Eds *Solon of Athens New Historical and Philological Approaches* (Leiden: Brill) pp. 351-398.
- . 2013. *Ships and Silver, Taxes and Tribute a Fiscal History of Archaic Athens* (London: I.B. Taurus).

Williamson, O. E. 1998. 'The Institutions of Governance' in *The American Economic Review* Vol. 88 No. 2 pp. 75-79.

-----, 2000. "The New Institutional Economics: Taking Stock, Looking Ahead in *Journal of Economic Literature* Vol. 38, No. 3. pp. 595-613.

Worster, D. 1989. 'Appendix: Doing Environmental History' in D. Worster. ed. *The Ends of the Earth: Perspectives on Modern Environmental History*. (Cambridge: Cambridge University Press) pp. 289–308.