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Managing Information in the Roman Economy

Edited by
Cristina Rosillo-López
Marta García Morcillo

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Contents

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List of Figures

PART I

Information, Economic Theory and the Roman World

CHAPTER 1

Managing Information in the Roman Economy: Introduction

Marta García Morcillo and Cristina Rosillo-López

Knowledge is a form of power that can easily lead to abuse. This idea is deeply discussed in Plato's dialogue *Protagoras* in connection with the eloquence of the sophists. In Socrates' eyes, the sophist, like the food merchant and seller, can deceive his customers when praising his wares (the doctrines).[1] Those trading with food, insists Socrates, tend to ignore whether the product is good for the body, and because they commend all

[1] Pl. *Prt.* 313b-c.

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the products they sell, the purchasers remain uninformed, unless they are trained in the matter. The same lack of discrimination is attributed to the itinerant sellers of doctrines.[2] The dialogue situates the rhetoric of both the sophist and the trader as strategies that are driven by similar principles of economic competition, in which advantage and profit are prioritised over cooperation and honesty. In contrast to practically applied *techné*, this form of unverifiable knowledge can easily generate inequality, as purchasers are prevented from accessing information that could be relevant to their decision-making.[3] In this way, Plato portrays the essential problem of asymmetric information in transactions and market relationships that are not or cannot be submitted—at least in advance—to 'fact-checking' scrutiny or,—to borrow a term from information economics—to signalling messages and mechanisms that allow buyers to test the quality of the items or services offered by the informed party.

The issue of private or hidden knowledge is an economic concept often encapsulated by the idea 'I know something that you don't know'; the opposite would thus be information that is 'publicly observable'. Informational asymmetry is not only a frequent phenomenon in market activities, but is a distinguishing trait of human relationships, and can be identified in numerous parts of our daily life. As Plato shows, the study of this idea—ancient and modern—requires a more complex understanding of the social and cultural structures that influence human behaviour. To what extent should the bearer of relevant information—seller or trader—reveal it to the other party? How can profit coexist alongside good faith and the moral obligation to share knowledge? These generic ethical considerations lead us to the fundamental question of how information is acknowledged and managed by the parties involved in such exchanges. In ancient Rome, philosophical treatises such as Cicero's *On Duties* (*De Officiis*) and Seneca's *On Benefits* (*De Beneficiis*) discussed these issues in relation to economic matters and behaviour, providing answers that matched the social and collective codes and concerns rather than the legal requirements and enforcement norms.

Seneca's *Letters to Lucilius* specifically address the problem of those who transformed the old virtue of wisdom into an obscure and skilful

[2] Pl. *Prt.* 313d.

[3] The problem of rhetoric not associated with virtue as a form of knowledge that generates inequality and power in the dialogue is discussed by Garver (2004).

science to exclusively serve their purposes.[4] One of the consequences of such an instrumentalisation of knowledge is a restricted access to information. In his defence of the transparency of the Stoic doctrines, Seneca resorts to the useful comparison between the philosopher and the seller (as did Plato), and pictures a hypothetical scene in a retail shop: "we have nothing that catches the eye (*ocliferia*), we do not deceive the purchaser; what he will find inside is nothing more than what is exhibited outside (*in fronte suspensa*): we allow the people themselves to select the exemplar from anywhere they wish (*ipsis permittimus unde velint sumere exemplar*)".[5] The marketplace features again as a didactical example of Seneca's battle of discreditation against those who twist or obscure the truth: "when you buy a horse you order to remove its blanket, you pull off the cloths of the slaves for sale (*detrahis vestimenta venalibus*) so that no defects of the body remain out of sight (*ne qua vitia corporis lateant*): how can you evaluate a man that is covered (*hominem involutum aestimas*)?" The philosopher's reasoning specifically refers to the pimping tactics of slave-dealers (*mangones*), and how their use of ornaments raises the suspicion of purchasers, who should thus demand that any clothed parts be removed from the slave's body.[6] These ethical considerations about issues that concern a lack of honesty and transparency, but also about the need to act proactively in the search of truth (and knowledge), are not by chance discussed by Seneca using examples from everyday life in which asymmetric information enables licit profit yet also opens the door to dubious and fraudulent behaviour. These concerns ultimately reflected situations in which all members of society were or had been involved, whether directly or indirectly. Responses by public authorities included specific regulations (such as the edict of the curule aediles), which introduced mechanisms to make the seller liable for any undeclared vice of the merchandise. Other public and private enforcement instruments and forms of information management, such as encoded systems of commercial advertising, contracts, public records of transactions, taxes and market structures, to a certain degree compensated for the essential problems of uncertainty. They also

[4] Sen. *Ep.* 95.13: *'Antiqua' inquit 'sapientia nihil aliud quam facienda ac vitanda praecepit, et tunc longe meliores erant viri: postquam docti prodierunt, boni desunt; simplex enim illa et aperta virtus in obscuram et sollertem scientiam versa est docemurque disputare, non vivere'.*

[5] Sen. *Ep.* 33.3.

[6] Sen. *Ep.* 80.9: *Mangones quidquid est quod displiceat, id aliquo lenocinio abscondunt, itaque ementibus ornamenta ipsa suspecta sunt: sive crus alligatum sive brachium aspiceres, nudari iuberes et ipsum tibi corpus ostendi.*

functioned as a counterbalance to the unequal access to information that generated business opportunities, yet also disadvantaged economic actors, and were essentially a source of transaction costs.

One economic sector that was particularly affected by this disparity in the management of information was the real estate market. A famous anecdote narrated in a letter from Pliny the Younger reveals the story of a large house situated in Roman Athens, which was either put up for sale or let by the owners. However, the advertisement omitted an important defect: the house had been haunted by a ghost that made the place uninhabitable. Regardless of the veracity of the story, Pliny reveals the important detail that the owners hoped someone who was ignorant of the disturbing circumstances would accept the offer. Someone did, in fact: the Stoic philosopher Athenodorus became intrigued by the suspiciously low price of the house and accepted the offer. Led by his curiosity concerning the mystery of the deserted house, he encountered the ghost and helped him to make peace with the spirit that had caused the problem.[7] Aside from the fame of the passage (which is often evoked as the earliest documented ghost story), Pliny reveals a typically speculative performance of sellers in the sector, as well as the function of prices as signals of irregularities or uncommon circumstances. The anecdote also shows, similar to the Senecan examples discussed above (which are also framed by Stoic doctrines), how knowledge of price behaviour within a specific market, as well as a proactive attitude by the uninformed party to test the data provided by the informed one, can to a certain extent compensate for the problem of uncertainty. Athenodorus' awareness of the average prices of houses in Athens during the Augustan age was not an extraordinary circumstance.

The alteration of prices in other sectors also drew the attention of Pliny the Elder. In his attempt to explain the variability of market prices (*pretia rerum*) of certain commodities in Rome and other places almost every year, Pliny provides a valuable reasoning that points to the effects of "shipping costs or the terms on which a particular merchant has bought them, or at some dealer dominating the market may whip up the selling price".[8]

[7] Plin. *Ep.* 7.27: *Deserta inde et damnata solitudine domus totaque illi monstro relicta; proscribebatur tamen, seu quis emere seu quis conducere ignarus tanti mali vellet. Venit Athenas philosophus Athenodorus, legit titulum auditoque pretio, quia suspecta vilitas, percunctatus omnia docetur ac nihilo minus, immo tanto magis conducit.*

[8] Plin. *HN* 33.164: *Pretia rerum, quae usquam posuimus, non ignoramus alia aliis locis esse et omnibus paene mutari annis, prout navigatione constiterint aut ut quisque mercatus sit aut aliquis praevalens manceps annonam flagellet.*

One of these dealers, a certain Demetrius, appears to have provoked a large scandal in the Seplasia, a commercial street in Capua known for its specialised market in expensive aromatic products, and for this reason was prosecuted under Nero. Pliny's proposal to mitigate this problem was to provide a list of prices that were usual in Rome (*poni tamen necessarium fuit quae plerumque errant Romae*) and thus establish a standard value (*ut exprimeretur auctoritas rerum*) that could be used as a reference for all actors involved in the business, including ignorant purchasers. In this regard, Pliny also notes that purchasers who pay exaggerated prices for dye should know that the cost of its production changes according to the season of the shellfish harvest, and its consequently variable supply.[9] Pliny's proposal to fix scales of prices and explain the mechanisms of transaction costs to battle speculation followed the didactic scope of the *Natural History*. In the Preface of the work, Pliny declares that among his aims was to provide judgement to what was new (*novis auctoritatem*), and bring light to what was dark (*obscuris lucem*).[10] The private use of information and restricted knowledge as a source of unjust profit could also impact the labour market. In this regard, Pliny the Elder complains that other kinds of speculators, namely doctors from Egypt who specialised in lepra, used their exclusive knowledge and experience to demand exaggerated wages for their services.[11]

The contributions that make up the present volume aim to deepen our understanding of the ancient Roman Economy by identifying and dissecting the information systems, networks and dynamics that both enabled and conditioned business and financial relationships. The study of knowledge as an economic source, but also as an instrument of power, invites us to evaluate economic activities within a larger collective mental, social and political framework.

The ancient texts seen above illustrate the Romans' awareness of the power of information, as well as the effects of informational differentiation on economic performance and fairness. To what extent did this understanding transcend the ethical level reflected in philosophical writings, and which was also discussed in legislative texts? We will, as far as is possible,

[9] Plin. *HN 9.138*. These cases are analysed by Lao (2011: 44–48), who demonstrates the advisory function of the work against ignorance and speculatory profiteers.

[10] Plin. *HN Praef.* 15.

[11] Plin. *HN* 26.4: *Adveneruntque ex Aegypto genetrice talium vitiorum medici hanc solam operam.*

disclose the complex connections between specialised knowledge, access to and use of information, and its impact on the strategies of economic agents. The volume also discusses the creation of innovative institutions aimed to improve and regulate such performances, yet also keep them under control. Our book builds upon, and is greatly indebted to, the remarkable previous scholarly research on economic theory, specifically on the economics of information, but also on associated theories such as New Institutional Economics (NIE), which have significantly impacted recent studies on the Ancient economy.

In a seminal article published in 1961, George J. Stigler advocated for considering information a key resource to understand the frequent problems attached to economic practices. The dispersion of prices that were often detected within various types of markets, even in the case of products of equal quality, is a phenomenon that Stigler attributed to ignorance and a lack of understanding of certain factors, such as the cost and value of the search, the changing conditions of supply and demand, and the potential effects of advertising. One of the battlegrounds of economic research in the 1960s was the elusiveness of the search for knowledge concerning the quality of goods.[12] Stigler's observation takes us all the way back to Plato's *Protagoras* and to the discussion on the problem of ex-ante unverifiable commodities, a pervasive issue in markets and economic thought, both ancient and modern.

Economic activities and relations necessarily generate situations in which one party is better informed than the other. The job applicant, the seller, the money lender, and the client of an insurance company are all in possession of relevant, exclusive information that is not necessarily shared with or known by their counterparts: the employer, the buyer, the money borrower and the insurance company, respectively. Since the 1970s, research into asymmetric information has occupied a major position in economic theory and challenged traditional assumptions of Neoclassical Economics about the existence of markets shaped by perfect information. Information asymmetry reveals the essential contradictions within theories such as the Walrasian equilibrium, based on the ideal existence of a perfect balance between supply and demand in economic markets. In 2001, the Nobel Prize in Economic Science recognised the substantial and

[12] Stigler (1961: 224) refers to how department stores invest in guaranteeing the quality of their products, and criticises economists who often assume that consumers accept the reputation of a seller on the basis of full knowledge.

innovative research developed by George Akerlof, Michael Spence and Joseph Stiglitz in the field of modern market theory and the impact of economies of information on our understanding of the functioning (and malfunctioning) of market structures, the interactions between actors and agents, and the economic consequences of these phenomena.[13]

The prolific amount of theoretical and empirically based research on the consequences of such asymmetries has led to remarkable outcomes. In Akerlof's famous and fundamental article "The Market for 'Lemons'" (1970), the trade in second-hand cars becomes a case study of private information as a source of adverse selection and its far-reaching effects. The impossibility for a buyer to gain reliable information about the quality of a specific car triggers a lowering of the average prices of all second-hand cars within the market, which ultimately works against anyone willing to sell good quality cars at a fair price, while creating a situation where it is only viable to trade in poor quality cars. Economic institutions that regulate markets and moderate the consequences of asymmetric information are identified by the author as an effective mechanism to palliate this problem.

Another way of mitigating the effects of asymmetric information and adverse selection is signalling, a mechanism that involves setting observable actions and signs that transmit private information to the uninformed party. The labour market is one field in which signalling has become a standard way for employers to compensate for the impossibility of observing the employee's productivity before hiring them.[14] An analysis of private information in the insurance market led Michael Rothchild and Joseph Stiglitz to identify a form of signalling known as screening. One screening method used by insurance companies with no information on customers or their risk situation is to offer various types of contracts and premiums that are subject to certain conditions. This form of self-selection also applies to the labour market, although here it is the employer who specifies the wage and signal—e.g. the level of education—within the contract.[15]

[13] On the contributions of these three key authors, see Löfgren, Persson, Weibull (2002). A general insight into economics of information is provided by Molho (1997).

[14] Spence (1973). In a more recent article, Spence (2002) discusses factors such as the allocation of time as a signal of interest and a screening device, as well as the impact of the internet on the changing information structures, as well as increasing practices such as outsourcing by firms and its effects on transaction costs.

[15] Rothchild and Joseph Stiglitz (1976). See also Wilson (1977) and Wolpin (1977).

While the economics of information is integral to the foundation of Microeconomics, it is only in more recent years that the field has found an echo in historical research. For example, the applicability of Ackerlof's theory, as well as the problem of adverse selection on the Roman slave and livestock market, has been analysed by Bruce W. Frier and Dennis P. Kehoe.[16] The authors show how the Roman legal system established rules that attempted to mitigate the problem of a lack of protection for uninformed purchasers by introducing liability mechanisms affecting the seller. The use of signalling devices was fairly widespread in Roman markets, and recent research in this direction has guided the scope and aim of the present volume. The management of information in the slave and labour markets will be the focus of detailed attention in two contributions of this book.[17]

A relevant aspect discussed throughout this volume is the economic impact of institutional measures such as guarantees, public records and contract clauses, which aimed to compensate and alleviate information asymmetries and reduce transaction costs. Following a NIE perspective, and more specifically, Douglass North's proposed definition of institutions, these can be understood as norms or rules, either formal or informal, that attempt to regulate human relationships.[18] Informal rules, shaped by cultural beliefs and traditions and shared normative frameworks, are regarded as particularly powerful vectors for the consolidation of institutions, but also for institutional change.[19]

NIE approaches have notably influenced the study of the Ancient economy in recent years. North's understanding of institutions and their relation to transaction costs—which refers to any factor or constraint that generates uncertainty and unpredictability in economic trade—plays a central role in NIE. The study of the cost of transactions evolved as an alternative to the postulates of Neoclassical Economics, dominated by the perfectly informed actor known as *homo oeconomicus*. Problems linked to information are indeed a major cause of transaction costs. This aspect, in relation to the question of economic rationalism, has been analysed by Jean Andreau and Jérôme Maucorant.[20] Following the work of economists

[16] Frier and Kehoe (2007).
[17] See in particular the chapters by Lavan and Holleran, and below.
[18] North (1990: 3–4).
[19] North (2005).
[20] Andreau and Maucourant (1999).

such as Oliver E. Wiliamson, Alain Bresson has explored the possibilities of NIE for the study of the Ancient Greek Economy.[21] Transaction costs and institutions that contributed to reducing them and improving the functionality of Roman society and economy, have been scrutinised by Frier and Kehoe in their aforementioned chapter in *The Cambridge Economic History of the Greco-Roman World* (2007). The authors investigate 'the rules of the game'—the institutional environment and norms present in economic organisations and structures that facilitated and regulated commerce in ancient Rome.[22] In his influential *The Roman Market Economy*, Peter Temin applies NIE to discuss the importance of contractual relationships and legal enforcement in the Roman grain market, in which traders had to face the endemic problem of hidden and asymmetric information, and circumvent issues such as adverse selection and moral hazard.[23]

A collective volume edited by Kehoe, David M. Ratzan and Uri Yiftach (2015) has scrutinised the often overlooked contribution of law to the Ancient Economy, and more specifically to an understanding of transaction costs and the institutional efforts to minimise and compensate them. Contracts, firms, agency, coinage and public archives are some of the mechanisms and instruments studied in this fundamental work, which also analyses the concept of knowledge applied to economic performance from the perspective of 'bounded rationality'.[24] The impact of public institutions and the state on the private market in relation to the theory of transaction costs has gained significant ground in recent years. Elio Lo Cascio has drawn attention to the constant preoccupation of Roman authorities about the negative effect of price speculation on the market. Enforcement strategies (the 'rules of the game') were thus put in place to control such practices and guarantee free competition.[25] One of these institutions, the *bibliothêkê enktêseôn*, operated, as François Lerouxel has shown, as a public archive that managed fundamental information for the regulation of the

[21] Bresson (2016 (2007–2008): 15–27; 415–438).

[22] The authors follow North (1991) and Klein (2000) in their examination of the 'rules of the game'.

[23] Temin (2013: 97–113).

[24] Kehoe, Ratzan and Yiftach 2015 (eds.). On the concept of 'bounded rationality', coined by Herbert Simon, see Frier and Kehoe (2007: 121–122).

[25] Lo Cascio (2018).

credit market in Roman Egypt, which contributed to reduce uncertainty, and thus transaction costs.[26]

One of the flaws of NIE, however, is the risk to overestimate the capacity of the state and its structures to enforce contracts and transactions.[27] Taco Terpstra has recently addressed this critical issue, as well as the importance of considering private order mechanisms and their interaction with public institutions as key factors to understand economic performance and the functioning of markets.[28]

Recent research on the role of informal institutions has shown the relevance of social relationships reinforced by shared mental models in the management of information and the minimisation of uncertainty in cross-cultural and long-distance structures of trade.[29] This avenue of research explores the impact of psychology on economic studies, an aspect that has been the focus of major attention in recent studies in the field of behavioural economics, and which investigates factors such as the process of decision-making and the complex ways in which information feeds and contributes to knowledge.[30] Koen Verboven has identified promising lines of research in this direction applied to the Greco-Roman world, as well as in fields such as development economics, as fruitful areas of future study to grow in parallel and complementarily to NIE.[31] From an economic behavioural perspective, it is central to understand how information is received and processed, namely how to recognise the mental mechanisms—including motivation and emotions—that lead to the formation of choices, preferences and decisions.[32] The perspective of performers and

[26] Lerouxel (2015). On the specific case study of real estate and the legal consequences of marriage, see the contribution of the author in this volume, and below.

[27] A nuanced criticism of NIE's model of institutional efficiency is discussed by Verboven (2015).

[28] Terpstra (2019: 13–32).

[29] See in particular, Broekaert (2017: 1–22). On the concept of shared mental models, see Denzau and North (1994).

[30] The way individuals process information is considered by 'prospect theory', a term coined by Kahneman and Tversky in 1979 which encapsulates the idea that real-life decisions very often deviate from expected utility theory.

[31] Verboven (2015). On the further recent applications of NIE, see also Droß-Krüpe, Föllinger and Ruffing (2016).

[32] On the main areas studied by behavioural economics, see Camerer, Loewenstein and Rabin (2004). Cicero's correspondence provides for instance a valuable corpus of materials to explore in detail these mental frameworks in interaction with elite social norms, see García Morcillo (2020).

the influence of the social environment in the handling of information and uncertainty feature strongly in the present book.

The contributions within this volume address the subject of asymmetric information and information management from a variety of complementary perspectives. The book is divided into four parts, each of which reflects distinct approaches, sectors and types of practices in which the economics of information can be tested. These are: (1) Information Management; (2) The Real Estate and Land Property Market; (3) The Labour Market; (4) Trade and Financial Markets.

The first chapter of our book, by the economist Pablo Revilla, provides a survey of key theories regarding information management and markets of incomplete information, which have shaped the field since the second half of the twentieth century, including Friedrich Hayek's "The Use of Knowledge in Society" (1945). Hayek's pioneering work identified market price mechanisms that functioned as a system of information exchange to allow coordinated decision-making within a decentralised system. Revilla goes on to discuss the theory of transaction costs, originally formulated by Ronald H. Coase (1937), as well as the problems and consequences of dysfunctional or incomplete information mechanisms such as moral hazard, leading to economic inefficiency and impacting wealth.

Following Revilla's contribution, the first section provides an in-depth discussion of two case studies of information management. Alejandro Díaz Fernández and Francisco Pina Polo engage with the question of what kind of public and private documents were available in the Roman official archives, particularly the *aerarium populi Romani*. How relevant was access to that information for the development of economic activity? The *aerarium* housed all official documents (*tabulae publicae*) generated by the Roman administration, which included, among others, lists of debtors and creditors of the state, lists of citizens with their tax obligations, and accounts of magistrates abroad. But to what extent was this documentation publicly accessible? Was it available only to magistrates, or to all citizens? Evidence from trials suggests that in theory, private citizens could also gain access. If so, the *aerarium* contributed to reducing the risk of asymmetric information in cases such as concessions to *societates publicanorum*. The consultation of this archived information, which would have included useful financial data such as the outcome of previous allocations, would have allowed these companies to bid more effectively.

The role of knowledge management in the functioning of Roman auctions—public and private—and the impact of asymmetric information on the actors' behaviour is the subject of the second chapter in this section, written by Marta García Morcillo. The auction system was, by its very nature, exposed to uncertainty and manipulation, which resulted in substantial information gaps and inequalities that could affect both sellers and purchasers. The applicability of modern auction theory, game theory and empirical studies are tested by the author in a series of well-documented case studies, which show how the Romans built a reliable information system for this kind of competitive sales, using marketing and enforcement mechanisms, as well as social norms. Ancient authors highlighted the importance of publicity, transparency and control of information as key factors within auctions. The presence of the auctioneer or *praeco*, the requirement of securities and guarantors, the Aedilician regulations, and registers of sales, among others, all ensured this. Yet these efforts faced also complex legal challenges, such as the formation of bidding rings or collusions, and the practice of shill bidding (which involved at least one fake-bidder).

The real estate market and the transfer of land titles are examined in the next section of the book. Saskia T. Roselaar discusses asymmetric information in transactions of land during the Roman Republican period, especially during the second century BC. Arguing for the existence of a free land market, Roselaar demonstrates how transactions in this sector were subjected to problems of unequal information, particularly affecting the relationships between buyers and sellers, and landowners and managers. There were also issues of asymmetric information in cases where land was worked by caretakers for absentee landowners. In the case of the *ager publicus*, a lack of information, and specifically uncertainty regarding its legal status, may all have impacted willingness to invest in state-owned land.

Cristina Rosillo-López studies the real estate market as a sector in which information asymmetries played a fundamental role, as was acknowledged by both Roman jurists and Cicero. The seller generally knows more than the buyer, not only about the item up for sale, but also about the characteristics of the neighbourhood and the prices within the area. In addition, the asymmetry is not equal in all cases, since some sellers and buyers are better informed than others. These disparities in information represent a unique feature of the real estate market compared to other markets, in which the mobility of commodities alters their transaction costs differently. In her contribution, Rosillo-López studies the legal, social and economic measures that attempted to bridge the gap of information asymmetry, both in renting houses or apartments and in letting. Screening and other similar strategies were practiced by buyers and sellers, while Roman law established measures that punished those who did not declare defects in real estate transactions, or who incentivised control over sub-letters.

Roman Egypt provides highly valuable evidence about the effects of state intervention in the property market. François Lerouxel examines two prefectoral edicts from AD 89 and 109 concerning a general register of individuals' property rights, the *bibliothêkê enktêseôn*, which dealt mostly with real estate. One of the main issues within these two edicts was the rights that some wives could have over pieces of real estate owned by their husbands. This public information was, however, not self-evident or automatically transmitted to the widow, which often provoked a problem in the case of a transfer, as the new purchaser may have ignored the widow's rights to the house; a wife might also discover that her husband had sold a house to which she held the rights. These two edicts attempted to tackle this issue in order to prevent long, complex lawsuits and to maintain the social and legal hierarchies by protecting the patrimonial order.

In the third section of the volume, two contributions offer a complementary insight into the labour market. Claire Holleran's chapter looks at factors such as market intermediaries (e.g. contractors), signalling mechanism such as qualifications, apprenticeships, letters of recommendation, and the membership of informal and formal associations as instruments to solve the problem of information asymmetries. Skilled workers, such as doctors and specialised craft workers, relied on signalling devices and the membership of professional associations to display their proficiency. For the employer, these signals also served as a screening model, in which wages were offered according to specific requirements and interpretable signals. Roman law protected buyers against the *imperitia* of poorly skilled workers by liability under contracts of *locatio conductio operis* and the *lex Aquilia*. Enslaved people were hired and borrowed for both skilled and unskilled work, which raised further questions of liability. Holleran clearly points out how these observable signalling devices and strategies to overcome information asymmetries in the labour market were used in both rural and urban areas.

In a similar vein, Lavan deliberates on the sale of slaves and the issues of asymmetric information that this created. Roman law devised strategies to solve the problem of slaves who turned out to have a disease or 'defect' in the buyer's eyes, including a lack of specific behavioural characteristics, such as obedience, diligence and entrepreneurship. Faced with this situation, the buyers paid particular attention to proxies for quality, such as the distinction between new and old slaves. The commodification of human beings and bodies cannot be successful, states Lavan, especially when mental and moral qualities need to be assessed. The antebellum US South provides a useful comparison with the Roman case, since similar questions regarding information asymmetries and slaves were raised and Roman legislators were used as models for norms in the profitable American market for slaves.

The fourth and final section of the book is dedicated to trade relationships, markets and the role of merchants and financial intermediaries in commercial enterprises. Mico Flohr focuses on space as a touchstone of information. How did developing urban networks and landscapes change the way in which economic information circulated? How could people obtain market information if they were strangers in a new place? The uneven distribution of *tabernae* outside Italy, in comparison with *porticus* and *basilicae*, provides a widely divergent picture. In regions like Baetica, Africa Proconsularis and Italy, a dense network of communication facilitated the circulation of information, while in less densely urbanised areas, information asymmetries (e.g. knowledge of products and prices) could be more easily exploited.

The control exercised by associations over economic life through information management is examined by Nicolas Tran in the next chapter. If a so-called de facto monopoly on activities existed, to what extent did it result from an unequal access to information, which depended on membership to a professional association? Roman *collegia* were able to foster and facilitate exchanges of information amongst traders concerning multiple, at times complex, commercial patterns. Yet while associations offered integration to their members, they also organised the exclusion of outsiders. This was especially relevant in the long-distance trade. Tran considers two trading communities attested during the second and early third centuries: the *corpus splendidissimum Cisalpinorum et Transalpinorum*, an association of merchants from both sides of the Alps, and long-distance merchants trading olive oil from the province of *Baetica*.

Long distance trade was an economic sector that demanded a high level of organisation and communication networks across large geographical areas. This is also one of the areas of study of the ancient economy that is most affected by a lack of evidence. Dario Nappo tackles the case study of commerce between the Roman Empire and India, including the issue of information gained through Roman coins found in India. The paper proposes that Roman coins were only exported to India when it was profitable, namely when the ratio between silver and gold in the two regions differed, which allowed merchants who benefited from the arbitrage to make large profits. This sophisticated financial action required great skill to overcome the lack of the necessary information to complete the transaction.

The role of information as a determinant of growth in general, and of the performance of the Roman financial system in particular, is discussed by Koen Verboven in the last chapter of this section. What opportunities and constraints determined the generation, codification, storage and transmission of information in the relationship with economic performance, i.e. the 'Information Governance System' (IGS)? Private order information governance systems included personal networks, communities and *collegia*, as well as practices such as accounting, registration offices and various financial instruments. While the dominant paradigm for long-distance trading organisations remained that of personal trust networks, the public order IGS underlying the credit market allowed these organisations a broader scope in arranging and handling their financial needs. Ethnically based communities and guilds did not control credit provisioning in long-distance trade ventures. Verboven argues that the institutional framework of the Roman empire offered procedures for information governance that supported the development of a market for financial services to long-distance traders, since the efficiency of a credit market depended on access to reliable information. The limitations of close-knit social groups as a credit system stimulated the use of specialised intermediaries (deposit bankers and businessmen who provided financial services) in long-distance trade.

Jean Andreau's concluding remarks reflect on the different ways in which information has been analysed in the present book. Firstly, he looks at specific types of transactions, which bring the protagonists together but also against each other (e.g. seller and buyer, or lender and borrower) and in which information asymmetry is clearly present. Secondly, he discusses from a more general perspective the primary role of information and its diffusion in Roman economic life.

All in all, the papers gathered in *Managing Information in the Roman Economy* offer a multifaceted view of asymmetric opinion, one that spans several centuries and fields of influence. One of the objectives of this volume is to demonstrate the productive and promising application to the Roman world of ideas and theories supplied by the flexible and prolific field of the economics of information, as well as those from other complementary perspectives that have proved highly useful for historical research, such as NIE. Our approach aims to demonstrate that information was not merely a vehicle and a source of profit, but also an instrument that provoked inequality and disadvantage, and which could also destroy the balance of functioning market structures and relationships. The Romans' awareness of this problem boosted the creation of a series of institutions that regulated, restricted and promoted public information and, in the long term, also contributed to the stability and improvement of markets. We are further interested in revealing the key factors that transformed information into knowledge, which involved an interpretative awareness of the use of such information, and the consequences of this process on the creation of institutions and mechanisms that reduced uncertainty and improved economic performance. Still, certain types of information inevitably escaped the control of legal enforcers and regulators. Should we simply consider this issue as an inherent risk and a detrimental factor to economic efficiency? Only through a deeper understanding of social and political structures, of the interactions between public and private actors and institutions, and of the collective and individual rules and mentalities that conditioned economic performance, we can get closer to assessing the complexity of the Roman economy. Ultimately, we hope that this volume will serve as a useful tool for comparative studies of economic history, and for research that explores the possibilities and challenges of modern theories in ancient economies.

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