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**PRODUCTION AND TRADE OF
ETRURIAN *TERRA SIGILLATA*
POTTERY IN ROMAN ETRURIA AND
BEYOND BETWEEN C. 50 BCE AND C.
150 CE**

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Abbreviations

Authors and editions used

- Cato, *Agr.* M. Porcius Cato (1934). *Cato and Varro on Agriculture*. Ed. by W. D. Hooper and H. B. Ash. Loeb Classical Library 283. Cambridge, Mass.: Harvard University Press.
- Cic. *Att.* Marcus Tullius Cicero (s.a.[c]). *Epistulae ad Atticum*. Ed. by L. C. Purser. Perseus Project.
- Cic. *Caecin.* M. Tullius Cicero (s.a.[a]). *For Aulus Caecina*. Ed. by Albert Clark. Perseus Project.
- Cic. *Dom.* M. Tullius Cicero (s.a.[b]). *On his house*. Ed. by Albert Clark. Perseus Project.
- Cic. *Fam.* Marcus Tullius Cicero (s.a.[d]). *Epistulae ad familiares*. Ed. by L. C. Purser. Perseus Project.
- Cic. *Mur.* Marcus Tullius Cicero (s.a.[e]). *For Lucius Murena*. Ed. by Albert Curtis Clark. Perseus Project.
- Columella, *Rust.* Columella (1948–1955). *Lucius Junius Moderatus Columella On Agriculture (vol. I–III)*. Ed. by Harrison Boyd Ash, E. S. Forster and Edward H. Heffner. The Loeb Classical Library. Cambridge, Mass.: Harvard University Press.
- Columella, *Rust.* Columella (1897–1968). *L. Iuni Moderati Columellae opera quae exstant. Vol. I–VIII*. Ed. by Vilelmus Lundström, Åke Josephson and Sten Hedberg. Upsaliae, Lipsiae, Gotoburgi: Eranos förlag.
- Dion. Hal. *Ant. Rom.* Dionysius of Halicarnassus (1960). *The Roman Antiquities of Dionysius of Halicarnassos. with and english translation by Ernest VCary, Ph.D. on the basis of the version of Edward Spielman*. Cambridge (Mass.): Harvard University Press.
- Granius Licinianus Granius Licinianus (1981). *Reliquiae*. Ed. by Nicola Criniti. Leipzig: Teubner.
- Isid. *Etym.* Isidorus (1911). *Isidorus Hispalensis episcopi etymologiarum sive originum libri XX*. Ed. by W. M. Lindsay. Oxonii: Oxford University Press.
- Paus. Pausanias (1903). *Pausaniae Graeciae descriptio*. Ed. by Fridericus Spiro. Lipsiae: B. G. Teubner.
- Plin. *HN* Gaius Plinius Secundus (2004). *Pline l’Ancien. Histoire Naturelle. Livre III*. Ed. by Hubert Zehnacker. Paris: Société d’édition Les Belles Lettres.
- Plin. *ep.* Pliny the Younger (s.a.). *Letters*. Perseus Project.
- Polyb. Polybius (1889–1905). *Polybii Historiae*. Latin. Ed. by Ludovico Büttner-Wobst Theodorus; Dindorf. Lipsiae.
- Strabo Strabo (2002–). *Strabons Geographika. Mit Übersetzung und Kommentar*. Ed. by Stefan Radt. Göttingen: Vandenhoeck & Ruprecht.

Tert. <i>Apol.</i>	Carl Becker, ed. (1961). <i>Tertullian. Apologeticum. Verteidigung des Christentums. Lateinisch und Deutsch</i> . 2., durchgesehene Auflage. München: Kösel.
Varro, <i>Rust.</i>	M. Terentius Varro (1934). <i>Cato and Varro on Agriculture</i> . Ed. by W. D. Hooper and H. B. Ash. Loeb Classical Library 283. Cambridge, Mass.: Harvard University Press.
<i>Dig.</i>	Theodor Mommsen (1889). ‘Digesta’. <i>Corpus iuris civilis</i> . Vol. 1. editio stereotypa quinta. 3 vols.
<i>Inst. Iust.</i>	Paulus Krueger (1889). ‘Institutiones’. <i>Corpus iuris civilis</i> . Vol. 1. editio stereotypa quinta. 3 vols.

Central reference works

CIL	CIL (1863/). <i>Corpus Inscriptionum Latinarum</i> .
Conspectus	Elisabeth Ettlinger et al. (2002 [1990]). <i>Conspectus formarum terrae sigillatae italico modo confectae</i> . Veränd. Nachdruck der Ausg. 1990. Bonn: Dr. Rudolf Habelt GmbH.
ILS	Hermannus Dessau, ed. (1955). <i>Inscriptiones Latinae Selectae</i> . Weidmann.
OCD	Simon Hornblower and Anthony Spawforth, eds. (2009). <i>The Oxford Classical Dictionary</i> . Oxford University Press.
OCK ²	August Oxé, Howard Comfort and Philip Kenrick (2000). <i>Corpus vasorum Arretinorum : a catalogue of the signatures, shapes and chronology of Italian sigillata</i> . 2nd ed. Vol. 41. Antiquitas. Reihe 3 Abhandlungen zur Vor- un Frühgeschichte, zur klassischen und provinzial-römischen Archäologie und zur Geschichte des Altertums. Bonn: Habelt.

General acronyms

DEM	Digital Elevation Model
FIAT	Fabbrica Italiana Automobili Torino
GIS	Geographical Information System
GRASS	Geographic Resources Analysis Support System
IBM	International Business Machines Corporation
ODBC	Open Database Connectivity
PCA	Principal Components Analysis
SRTM	Shuttle Radar Topography Mission
USGS	U. S. Geological Survey

Introduction

Research Focus

Individuals and groups participating in Roman pottery business acted according to a partially or wholly shared logic. While limited in the means of access to the motives and practices of these people, we can still ask who they were, why did they act, and perhaps most interestingly, what was the shared logic (or the partially shared logics) that made their actions meaningful and sensible in their own culture. In fact, one of the main objectives of this work is to inquire whether the Weberian concept of ‘practical’ rationality allows for an adequate interpretation of the activities of pottery producers and traders or whether we need to envision some kind of ‘substantive’ rationality guiding their practices; we will return to these concepts later. Considering how much is known of the ideology of ‘political economy’ of the Roman upper classes, we should ask also how much of the apparent ‘substantive’ features of this ideology is real and how much is just a play-act to appear proper in the public eye; also, how low does this ideology reach down the hierarchical ladders of Roman society. To reformulate: If we suppose that that ideology was taken seriously in some of its aspects by upper classes, was the same true also for the lower echelons of the society where the perpetrators of pottery production and markets reside?

Between 50 BCE and 150 CE an immense amount of tableware was produced within the area of Roman Etruria. This tableware of reddish colour and with a fine glossy slip finish, these days called *terra sigillata*, more specifically *terra sigillata italica*, traditionally also *Arretine ware*, became very popular and was distributed all over Etruria, the Roman world, and even beyond. All in all, it was just another product type in the series of different pottery types gaining popularity in various regions of the Mediterranean area, and its ‘market domination’ just a phase in the commercial history of pottery trade of the Graeco-Roman world. The nature of this phenomenon, therefore, is not something especially special nor unique.¹ And yet, *terra sigillata italica* was not Athenian black figure pottery nor was it *African Red Slip* (another type of reddish pottery, popular in the 3rd c. CE). What it shared with these (and many other) types of pottery, among other things, was that it started as ‘local’ production, became popular, and ended up to be ‘globally’ popular. But in each of these cases, histories behind pottery types are different. The Roman Empire was composed of regions that had very different traditions, and whereas some socio-economic factors and cultural values led to the flourishing of one form of production at one place, other factors and values produced other viable strategies of survival and economic prosperity in other parts of the empire.² The focus of this work is on Central Italy, the context of the production, marketing and trade of *terra sigillata italica*.

The first question of this work is about the history of this particular pottery type, *terra sigillata italica*, and the question is as simple as ‘Why?’ In the case of *terra sigillata italica* this question

1 For an introduction to the ceramics of the Roman world, see e.g. Gandolfi 2005.

2 See for example MacMullen 2000 for a detailed and convincing analysis of the level of romanization, and the level of cultural cohesion in the time of Augustus. MacMullen argues that it was during the time of Augustus that we can begin to speak of a ‘cultural homogeneity’ in the empire in any sense, and that before this time, no such unity can be seen; a full unity was hardly ever realized.

expands to a discussion about the people behind production. The production in Etruria, a geographically and culturally definable area in the middle of the political turmoils of late Roman Republic, had its roots in local traditions, and it is obvious that the beginning of production – or a development of a local tradition of production – must be analysed in the context of the precarious political situation. Production does not ‘just begin’, it is started by people, active persons, and the question ‘why’ is directed towards the circumstances these people are in. Why did they start producing this new type of pottery?

To a modern reader, accustomed to the wide selections of consumption items in local stores, and in later years, to the presence of online markets for almost everything, it may not be evident why actual trading and transport practices themselves would be a matter worth investigating. The ingenious solutions to the challenges posed by the constant flow of consumption items from factories to the walmarts of today are well hidden from the eyes of consumers but from the point of view of market logistics, things were very different in the Roman world. Transport was slow and tedious, and costs of transport were both high and relative to transport methods. Information about markets was unreliable and haphazard, and combined with slow and costly transport, made advance assessments of profitability impossible. Marketing pottery was not as straightforward as bringing products to fill the demand. The functioning of the markets is a question that is also bound up with the first question presented in previous paragraphs as it is hardly credible that the producers would have begun to produce items without any preconceptions of possible markets.

The two above-presented questions – one of production, other of marketing – share one principal feature. Both of these questions are about *people*, i.e. individuals and groups of individuals. In the context of this work, we can suppose that the actions of these individuals and groups obey some kind of *rationality*. Rationality is a complex concept, and should be used with care; in this work, I borrow the definitions of Max Weber. He defined four different types of rationality, practical, theoretical, substantive, and formal, which were connected to his fourfold typology of social action, affectual, traditional, value-rational, and means-end rational – at least if we are to believe Stephen Kalberg’s reconstruction of these, for as he himself notes, Weber’s discussion on the theme is scattered and fragmented.³

Of these Weberian rationality-types, substantive and practical describe best the activities of producers and traders in Antiquity. ‘Theoretical’ is something that could be found among the Greek philosophers, especially the practitioners of early natural philosophy. It means an approach to reality which strives for abstractions and understanding, and would very well describe the activity behind this study but hardly the practical operations of pottery producers and traders. ‘Formal’, on the other hand, could easily be found among Roman jurists, and probably also among some members of governmental bureaucracy if only we had the sources available to study those institutions. Formal rationality, in Weber’s sense, means ordering actions and decisions according to an existing code or law without considering the individual nature of particular situations, nor the particular ethical or ideological positions of individuals involved in the situation.⁴

Compared to the generalizing approaches of formal and theoretical types of rationality, the substantive and practical are both based on the situated individual. Both are based on the idea of finding practical, ad-hoc solutions to situations at hand without necessarily considering the generalizability of a particular solution to an overall solution to a similar situation. In Weber’s theory, the difference between these two is that the substantive rationality always keeps present a ‘higher cause’. Where practical rationality is based on a ‘purely means-end calculation’ (for example, to produce as many pots with as small a cost as possible), substantive rationality takes

3 Kalberg 1980, 1146, *passim*.

4 *Ibid.*, 1152–5, 1158–9.

into account values, or ‘value postulates’. (as in, to produce as many pots with as small a cost as possible while still appearing to be focused on agriculture and politics, as the ‘value postulate’ calls for the maintenance of a public profile that is in accordance with the traditional values of the society. Here the ‘value postulate’ is not formed by the values of the society, but by the individual’s choice to appear to conform to these.) In Weberian thinking, also the esthetic notion of ‘beautiful’ was part of substantive rationality.⁵

One could ask, whether a ‘purely means-end calculation’ is really possible at all. According to Weber, in historical contexts this type of rationality is most commonly found by artisans, merchants and traders that tend to organize their way in a self-interested manner, in a most practical form possible. One could still inquire if this organization is truly ‘valueless’ – it is still based on self-interest, and what is self-interest if not a value? In fact the Weberian concept seems somewhat more substantial. Kalberg writes:

Small groups, organizations, institutions, political entities, culture, and civilizations are, in every era, ordered in terms of specifiable value postulates, even though these may be not readily identifiable by their participants and can be so fundamentally foreign to the values of the social researcher that he can scarcely imagine situations in which they acquire validity.⁶

In other words, ‘past is a foreign country: they do things differently there.’⁷

The main reason why just *terra sigillata* itself can be used to answer these questions is the stamps pressed on items during production. In chapter 1 (‘The analysis of *terra sigillata* distributions’), I present a collection of *terra sigillata* items, and ask how this material allows me to give answers to the questions of this thesis.

One important key to understanding the diffusion of *terra sigillata* is its producers. The main result of the long tradition of Roman Economy studies is the understanding that nothing is obvious when considering the motivations for and the reasons of economic activities.⁸ Chapter 2 (‘The social context of Etrurian *terra sigillata* production’) argues that the motivations of producers should not be sought within the ideological representations of upper class literature but in the precarious economic and social situation of land-owners in particular places. Thus, what guided production was not profit-maximization nor social self-presentation but a simple need for economic survival. Therefore, this chapter challenges the dominance of interpretations based on readings of imperial literature for the public ideology of Rome’s post-republican upper classes, often uncritically accepted by modern researchers.

The next stage in the process of commercialization was traders who for the most part are not to be found in any surviving literary sources. Their identity will remain anonymous but their actions have left traces in pottery distributions, and chapter 3 (‘Routes of trade and transport’) will begin the process of looking for these traces by reconstructing some of the field of possibilities and constraints within which they formulated their practices. The argument is based on transport costs incurred by pottery, and the most important question to ask in this chapter is how important the transport costs for the distribution of pottery were. The hypothesis will be that the trade of *terra sigillata* pottery was operated by mostly individual, independent traders for whom trading was a way of life more than a profit-oriented choice of capital investment.

5 Ibid., 1151–2, 1155–7.

6 Ibid., p. 1155.

7 From L. P. Hartley’s *The Go-Between* (1953); a widely used proverbial expression ever since.

8 The importance of M. I. Finley in this development can hardly be overstated. One may disagree with many of the individual interpretations in *The Ancient Economy* (1985) but the general message of the book still speaks loud and clear: there is a significant qualitative difference between modern economic thinking and the mental world of the upper classes of ancient cultures.

The reason why transport costs allow us so well to address the nature of the traders is that in the way of itinerant trading, moving oneself around with one's traded items was the expected form of life and the markets were chosen by expected sales. In the opposite case where trade was handled by merchants operating on large scale, transport costs incurred were very decisive, as land transport was slow, and the work force – even slaves – cost every moment, making economies of transport important for whole-sale traders. Also, the length of time period under study permits the question of possible changes in marketing practices.

Chapter 4 ('Market mechanisms') focuses on marketing practices of *terra sigillata* in Etruria. It begins by describing the physical institutions connected to markets, like forums, market halls, and daily and weekly markets, and discusses the potential presence of *terra sigillata* trade in these institutions. This leads us to the study of the nature and existence of trade organizations in *terra sigillata* trade in the region and its effects on trading patterns of pottery, and more generally, to the problem of integration between production and trade. This is done with an analysis of local pottery compositions and their internal cohesion. The idea behind this analysis is that if trading practice is somehow organized or centrally managed, the data will have some kind of inherent cohesion that will manifest itself in geographical diffusion of *terra sigillata*, and therefore in local find compositions. The purpose of this chapter is thus to assess the probability of any centrally organized trading organization without really paying any attention to the nature of that organization: it could just as well be a senator running the whole business or a trader's organization along the lines of medieval guilds co-ordinating the markets. This is a limitation dictated by the source material that can only be used to show the existence of an organization but not its nature.

The local find composition of *terra sigillata* is also the starting point of chapter 5 ('Market zones and patterns of consumption'). All *terra sigillata* items under analysis have been found somewhere, and it can be assumed that local assemblages reflect to some extent local consumption of pottery. This allows for a comparison of different localities with each other based on the composition of pottery assemblages at each, and based on these comparisons, it is possible to investigate the factors that might contribute to the similarities and differences in pottery assemblages between localities. We can *prima facie* assume that there must have been changes in these patterns, if for no other reason than that the main production site in the beginning of study period was Arretium and during the later part of the period Pisa. The question about the nature of these changes and what these changes imply still remains. The question addressed in this chapter is very similar to the question of the previous chapter but the method used is different; this will hopefully bring out new features in the data and enable a deeper understanding of marketing practices.

Although it is at this point possible to understand in some ways what producers and traders did in this area, it is important to remember that this is not the whole story. From the early stages of production, export was an important part of *terra sigillata* distribution, and to understand better both the production and trade of pottery, we need to take into account also the export outside the region. It will be made evident in Chapter 6 ('Traders in the Empire') how inherent limitations of *terra sigillata* material available for this study preclude a comprehensive analysis of export practices; therefore, I will concentrate on the presence of Etrurian *terra sigillata* in the Gallic provinces. This choice will have the fortunate effect of enabling the study of the effect of competing local production on export practices of Etrurian producers and traders.

In the conclusion to this study, possibilities and constraints of production and trade are summarized together in an interpretation that could be used to place the individual working at different stages of *terra sigillata* production and trade in the context of Roman culture. Also, a view on the further openings provided by this study is offered.

Sources and methods

The sources available for a study like this are limited. ‘Economy’ as an analytical concept does not exist in the classical context⁹ and commerce and production appear in the highly ideological and socially stratified literary production of the later republican and early imperial period only sporadically.¹⁰ Archaeological material is by nature different, and can be used to analyse transport practices in a way literary sources do not permit.¹¹ Whether using literary or archaeological sources, the subject of the study will in some way be defined by the preservation processes of written and material remains. This is true also in the case of this study. *Terra sigillata* was not the only pottery type manufactured in the Roman world, and Etruria was not the only region with large-scale productive activities, nor was pottery the only type of items traded. From Romans’ point of view, many other commodities would have been at least as important as pottery but as said above, we are limited by the remains in what we can do. In the case of this study, the *terra sigillata* type of pottery was selected as the main type of material remains to be studied for very good reasons.

First, the tradition of *terra sigillata* studies is long. These items awoke interest already in the 18th century because of their high quality and especially because of textual stamps often placed on the items during production. The most useful result of this tradition in the context of this work is the collection and database of *terra sigillata* items known as *Corpus Vasorum Arretinorum*¹², the second edition of which appeared in 2000. This edition, summarizing the work of August Oxé, Howard Comfort, and the editor of the second edition, Philip Kenrick, contains tens of thousands of *terra sigillata* items bearing these makers’ stamps’ of which 4,611 were found in the area of Roman Etruria. The total amount of different stamp forms in the whole database is 2,584, each form often having up to 30 sub-types. Of these stamps, 2,731 appear also within Roman Etruria. This huge database is published electronically on a CD-ROM with the book, and it is this digital database that allows me to perform the complicated spatial and statistical analysis in the work.

The utility of *terra sigillata* for a study like this is not limited to the actual database as also the contents of stamps are also recorded in the publication. These stamps were placed on the items at some time during the production process, and they are individual for each producer. (More on the meaning of these stamps and their relation to the producers in chapter 1.) The long tradition of *terra sigillata* studies has brought to light many production sites of this pottery, and the stamps that these items bear thus link each item to the place of its production. In many cases, it is possible to find out, in addition to the place of recovery, also the place of production of each item in OCK².

The database also contains information about the dating of items, pottery forms used, decoration motifs, and the maker or producer of the items. This additional data is used when relevant to the questions of the present work. For example, decoration motifs would provide material for a wholly different kind of analysis which, however, is beyond the limits set for this study; same goes for the item forms. The dating of items, however, will be a very important tool in this work as it will allow me to address questions of change and development. The identification of potters will be important in certain parts of the study where the practices are taken to the level of individual producers and agents.

9 Finley 1970.

10 See Habinek 1998 for a wonderful analysis of the ideologically charged position of latin literature, and also Grant 1995, esp. 61–89 for a critique of Greek and Roman historians and their objectivity.

11 Kevin Greene (2007) warns against using archaeological material ‘just’ to illustrate arguments based on literary sources. This study tries to take the use of archaeological material somewhat further than that.

12 OCK².

The methods used to analyse this collection of *terra sigillata* items and stamps will be presented in detail in chapters where they become relevant. It will suffice here to say that the methods combine a Geographical Information System (GIS) with multivariate statistical analyses, mostly belonging to the type of analysis called cluster analysis. The GIS system used is Geographic Resources Analysis Support System (GRASS), currently developed by the Open Source Geospatial Foundation. The geographical background data was developed using the Shuttle Radar Topography Mission (SRTM) data provided by U. S. Geological Survey (USGS), and available for scientific use.

In the case of this study, literary evidence is circumstantial. There are no manuals of pottery trade, nor treatises of marketing practices. The surviving literature is not completely useless, either, but the evidence just has to be searched for, and interpreted in the right light.

Economic writing in the sense of modern day economic thinking did not exist. This fact may lead to the perhaps faulty conclusion that the ancients did not practise economic thinking at all. Economy and economic thinking may not have been conceptualised in our words, and theoretical discussions might have been limited to few Aristotelian texts¹³, but economic practices, or, should I say, representations of economic practices, are very much present in many writings. Thus far, literary sources seem to provide two different types of practical economic information. First, we have letters and diaries of individuals, where they describe occasionally their own economic activities, like Cicero or Pliny the Younger, also occasionally Cato the Censor's agricultural treatise. In these cases, the actions described have to be seen through the self-promotion of Roman elites. These letters in the form they have survived were always meant to be published, and therefore, they cannot be relied to contain a *complete* account of their authors' economic activities; they only present the ones that were somehow presentable, even good to portray.

On the other hand, we have more generalised accounts of geography and land ownership. Of these, the geographical accounts of Pliny the Elder and Strabo describe generalities, such as that the city of Patavium, modern day Padova, sent large amounts of clothing to the markets of Rome,¹⁴ or that the river Clanis – modern day Chiana – was navigable in Pliny's time, and flat-bottomed boats were used to transport products of the river valley downriver to Rome.¹⁵

Land ownership manuals of Cato, Varro and Columella describe best practices for owning a farm, the economic action *par excellence* of the times. The authors write about generalities regarding the geographical position of the land, for example what should be found near the farm and what should be avoided. These seem self-evident to us but for example the fact that Cato stresses the importance of a good road nearby is clearly of interest. The economic thinking of agricultural writers has been studied to quite some extent,¹⁶ and they have been used in heated discussions about profitability and efficiency of Roman agriculture. Especially of interest have been the writings of Columella, as he in some cases presents productivity levels which were achievable again only in late 20th century.¹⁷ These, then, have either evoked modernising tendencies or skepticism, depending on the personal opinions of the researcher. In my opinion, importance, for example in the case of Columella, is not in the exact figures he presents but the kind of thinking they represent; here we have to point out the thing already said by Finley that this kind of economic thinking is not a sign of abstract economic analysis but that it should be more appropriately called 'common-sense' that is available to anyone.

The nature of these sources is anecdotal, at best, but as Barbara Levick has noted, '[t]he value of

13 Finley 1970; Meikel 1991.

14 Strabo, 5.1.7.

15 Plin. *HN*, 3.53–55.

16 Suaudeau 1957; Martin 1971.

17 Carandini 1983; Duncan-Jones 1974.

[anecdotal evidence] is that it often reveals unargued, even unconscious presuppositions that run along the lines of thought of the speaker or writer and emerge comparatively uncensored.¹⁸ This summarizes well the methodological approach to written sources used in this study. Considering the scant attention paid by the surviving texts to small-scale traders, and the complete lack of any written sources produced by the group of people themselves, the best approach to glean information from the texts is to hunt for oblique or indirect references to trading activities, and what is more difficult, to notice omissions.¹⁹

The main challenge in textual interpretation is a result of a particular kind of otherness, composed of two major elements: a complete lack of any equivalent to the modern concept of ‘economy’ in ancient languages; and the resulting lack of an overarching meaningful superstructure to imbue apparently economic statements with contemporary analytical meaning. These are the claims well presented by M. I. Finley, but they are still worth repeating, as their importance is easily forgotten. Finley’s points are easily summarized: The Greek concept ‘oikonomia’ is more akin to ‘household management’, to the knowledge of how to manage your properties that consist of land, slaves, wife and children; Aristotle never wrote any economic analyses at all, and any interpretation of common sense-wisdom or layman’s knowledge as an indication of economic analysis is misguided.²⁰ In this Finley follows Joseph Schumpeter and quotes him: ‘In economics as elsewhere, most statements of fundamental facts acquire importance only by the superstructures they are made to bear and are commonplace in the absence of such superstructures.’²¹ What Finley means by this quotation is obvious: a common-sense observation does not become ‘economic analysis’ unless it is made to bear a theoretical model. But actually the point in Finley’s critique is directed towards those economic historians who too easily adopt anachronistic assumptions about the institutions and economic organization of the Classical World, and too easily assume the same level of knowledge for the ancient people of their situation in this economic context and the economic situation of the times. According to Finley, the ancient world was a place where principal assumptions of modern economic science do not necessarily hold.²²

There are some ways one could try to bridge the chasm created by this cultural distance between us and the ancients. The ideas of Pierre Bourdieu offer one such possibility. In a relatively recent book he states that the social world is present in each and every economic action, and therefore one has to arm oneself with such methods as allow for construction of historical models capable of making sense of economic actions and institutions without playing down the multitude of their functions and cultural positions.²³ This complicated claim embodies well the ideological position that I, a cultural historian using quantitative methods to study economic practices in the past, have adopted, and is thus worth opening in some detail. Bourdieu bases his statement on the principle of social embeddedness of economy by stating that the social world is in its entirety present in each economic action. A cultural historian might prefer to use the word ‘culture’ instead of ‘social world’ but basically the idea is the same: economy cannot be seen

18 Levick 2004, p. 182.

19 This is actually very difficult, because we are separated from the discursive culture of the ancient world by a gulf of almost two millennia. It is simply very difficult to understand, what a text is all about, what is *typical* and what is *particular* for a text of a certain kind. See Doody 2009 for a discussion about the nature of some well-known texts we easily place under the category ‘encyclopedic’.

20 Finley 1970.

21 Finley 1999, p. 20; Schumpeter 1954, p. 54

22 Finley 1999, 20–25.

23 « [P]arce que le monde social est tout entier présent dans chaque action “économique”, il faut s’armer d’instruments de connaissance qui, loin de mettre entre parenthèses la multidimensionalité et la multifonctionnalité des pratiques, permettent de construire des *modèles historiques* capables de rendre raison avec rigueur et parcimonie des actions et des institutions économiques telles qu’elles se donnent à l’observation empirique. » Bourdieu 2000, p. 13.

as a separate field of action somehow dominated by timeless practices. At the other end of the statement, Bourdieu emphasises the role of empirical observation in providing economic actions and institutions that need to be understood by constructing historical models. These historical models, as I see them and as they seem to be implied also by Bourdieu, are neither simplistic nor universal but are formed of multiple overlapping, and in some cases even contradictory, explanatory structures; this is obvious from Bourdieu's statement on the methods to be used. According to him, one should arm oneself with such instruments of analysis which do not hide nor diminish the multidimensional and multifunctional nature of practices. Bourdieu's vision of the study of economic practices seems to imply a combination of both structural analysis of the typical and general as well as a sensibility to the importance of the particular and individual. The statistical methods selected for the study allow for both, enabling me to address the general patterns in the data while at the same time bringing forth the anomalous cases.

Tradition

Finley's view of the Roman Economy, and past in general, was very structural. This was the tenor of times when Finley produced his seminal contributions in the field. Things did change, however, and so did research interests. The field of ancient economy studies has seemingly divided into two separate branches, one closely following economics and economic history in general, the other more historical in its approach. Corresponding with the first branch, there remains a strong tendency to produce overall models that could be used to say something definite and over-arching about the ancient world. Examples of this kind are for example the 'Taxes and Trade'-model by Keith Hopkins²⁴, the studies of monetary history by Richard Duncan-Jones.²⁵ and also general models like those proposed by Willem M. Jongman²⁶ and Walter Scheidel²⁷.

Examples of the second branch also abound, and for this study, influences from these may be somewhat stronger. These studies are typically about a certain social and economic group, like business managers of Aubert²⁸, individuals, like the banker *Lucius Caecilius Lucundus* of Jean Andreau²⁹, institutions, like the markets of Joan Frayn and Luuk de Ligt³⁰, or even geographical areas, like the Biferno Valley of Graeme Barker³¹, just to cite some examples.

In this tradition, the study of the producers and traders of *terra sigillata* is well established. As noted earlier, the tradition of *terra sigillata* studies is long, and by necessity research has already touched on matters relating to production and trade of *terra sigillata*. Most of this research is very relevant, and this work should be considered as an addition to the tradition. The novelty of this study does not rise from its ground-breaking re-interpretation of well-known evidence but from the use of archaeological material in addressing very cultural historical questions. Mixing of material sources, quantitative methods, and cultural historical viewpoints forms a very profitable mixture that has not been used thus far. Spatiality, materiality, practice, even habit, are all concepts that can be made to bear on this mixture. In particular having had to argue for the use of quantitative methods has brought me to the understanding of the best nature of these methods as heuristic tools.³²

24 Hopkins 2000; Hopkins 1995/96; Hopkins 1980; Hopkins 1978.

25 Duncan-Jones 1982; Duncan-Jones 1990; Duncan-Jones 1994.

26 Jongman 2007a; Jongman 2007b.

27 Scheidel 2008; Scheidel 2007; Scheidel 2005.

28 Aubert 1994.

29 Andreau 1974.

30 Frayn 1993; Ligt 1993.

31 Barker 1995.

32 I have discussed these theoretical standpoints elsewhere in more detail, see Kiiskinen 2010.

I have not been able to find any studies where quantitative methods would have been extensively used with the OCK² database. In the book accompanying the database itself, some distribution maps are present but they have barely scratched the surface of what really could be done with the data. In the forthcoming chapters, I intend to demonstrate what really could be done with the data in this database. As with all databases, it is not perfect. It does not contain all data, and even though new data has been made available after its publication, I have refrained from trying to add data to it. The amount of work done by the three editors of the database over the last decades has been immense, and had I opted to add new material to it, to obtain a significant addition I would have had to spend years in accumulating the data. Now I have been able to concentrate on developing new methods and looking for old ones to apply. It is obvious that this work would be nothing if not for the immense work done by August Oxé, Howard Comfort and Philip Kenrick in collecting the data. It is good to stand on the shoulders of giants.

And they have not been the only ones. One can hardly study *terra sigillata* in Etruria without acknowledging the work of Giovanni Pucci, who has written extensively on the production of *terra sigillata*.³³ Simonetta Menchelli and Marinella Pasquinucci have done important work on the economic geography of North-Western Etruria.³⁴ Gunnar Fülle did very important work on the stamping practices of *terra sigillata*.³⁵ Along with many others, these scholars have also done the kind of research that allows me to take this research further than otherwise would ever be possible. Without any derisory intention, they have done just the kind of research I would not want to do but without which this work could not be done.

There are very few precursors to the particular approaches selected in this thesis. One notable exception is César Carreras Monfort, who in his thesis did a spatial analysis of trade networks in Roman Britain and seems to have used very similar approaches; ‘seems’ I write as I have been unable to consult this unpublished work. In a later article he tried to widen the perspective to the whole Roman Empire.³⁶ In spite of all his methodical ingenuity, he still remains a prisoner of a need to find one model to explain it all; he keeps looking for explanations until he finds the ones that suit his need of convincing the reader of an existence of market-oriented network dictated by the costs incurred by transport. Contrary to his model-guided and explanation-oriented approach, this work aims to understand the practices through an interpretation of pottery remains with the aid of various tools of quantitative analysis.

As should have become already apparent from the discussions above, the aim of this study is something very different: to chart probable and likely practices inasmuch as they can be found in the material selected for the study.

33 Pucci 1993; Pucci 1992; Pucci 1985; Pucci 1981; Pucci 1973.

34 Pasquinucci and Del Rio 2004; Menchelli et al. 2001; Pasquinucci and Menchelli 1999; Pasquinucci and Menchelli 1995.

35 Fülle 2000a; Fülle 2000b; Fülle 1997.

36 Carreras Monfort 1999.

1

The analysis of *terra sigillata* distributions

What is *terra sigillata*?

Terra sigillata is a modern expression. The concept cannot be found in ancient sources, as it was coined by the Italian 18th century scholar Francesco Rossi, and also used by H. Dragendorff in 1895. It was adopted into wider use from there, although in Anglo-Saxon contexts the expression *Samian Ware* traditionally was (and still occasionally is) used to refer to the same kind of pottery. The definition of the concept is not altogether clear, and Giovanni Pucci has concluded that on one hand the term has come to mean only fine table-ware of the Hellenistic and Roman periods with a glossy surface finish of red, orangish or black colour, and on the other hand, the extent of the original context has been widened by the inclusion of plain, undecorated vessels made with the same technique.¹

Simonetta Menchelli has recently provided a very wide definition: *terra sigillata* means fine tableware with a red varnish that has been produced in the Roman world from 2nd c. BCE to 6th c. CE. Its commercially most significant sub-divisions are oriental, Italic, Gallic and African sigillata.² Consequently, the concept has seen geographical sub-divisions, such as *italica*, *hispanica*, *africa* etc. In *Enciclopedia dell'arte antica classica e orientale. Atlante delle forme ceramiche II. Ceramica fine romana nel bacino Mediterraneo* the main divisions are to Eastern Sigillata, Spanish Sigillata, North-Italian Sigillata and Italian Sigillata, with the Eastern group having even further sub-divisions. In addition, the book has a chapter on thin-walled ceramics (*ceramica a pareti sottili*).

Within the family of *terrae sigillatae* the Italian version forms a family of its own. For a long time it was called 'Arretine ware' because the town of Arretium was central in the production process.³ In fact, Křížek's analysis of the ancient usage of both 'samian ware' and 'Arretine ware' has some important conclusions. First of all, it seems that at least in the somewhat later usage, 'Samian ware' seems to mean pottery of any kind, the 'samian' referring to the mythical place of origin of the invention of cooking the pottery. 'Samian' would in this interpretation mean the same as 'earthen', referring to pottery as opposed to metal (and glass). But what is even more interesting, according to Křížek 'Arretine ware' was in later periods used to refer to the whole class of red pottery. This is evident from the use of the concept given by later authors, and would point to the huge importance the actual production of Arretium would have had.⁴

Incidentally, a recent analysis of the terms 'arretinus' and 'arretinum' appearing on some of the items themselves by Daniele Malfitana seems to point to a similar conclusion. It does not seem

1 Pucci 1985, p. 365; Dragendorff 1895.

2 Menchelli 2005, p. 155.

3 Ibid., p. 155.

4 Křížek 1961.

1. The analysis of terra sigillata distributions

that Malfitana was aware of the work done by Křížek but he comes to similar, although more modest conclusions. Comparing cases where ‘arretinus’ and ‘arretinum’ appear on the stamps, Malfitana concludes that there was no original brand ‘arretinum’ which combined with ‘vas’ could be used misleadingly by producers in other regions as Arretine potters themselves never used the word in this sense; we only have ‘arretinus’ appearing in cases where the potter himself was active in Arretium.⁵ This evidence supports Křížek’s interpretation, although Malfitana does not go as far as to claim that Arretine ware or *vas arretinum* would mean *all* red-coloured pottery as Křížek does.

Is there anything to separate the Italian variety from others? Perhaps the most succinct answer to this question is by C.M. Wells, who sidesteps the actual definition of *terra sigillata italico modo confecta* elegantly with a tradition-based criterion: That which looks like Italian kind of sigillata is ‘Italian Sigillata’ or ‘wherever it is made, which in appearance [...] closely resembles the products of the Arretium workshops.’⁶ The editor of the later version of OCK² Philip Kenrick follows the policy adopted by the Conspectus that what looks like Italian sigillata is Italian sigillata.⁷ This criterion may sound too vague but we have to remember that it is based on decades of research, and has already survived as a valid definition for generations of researchers. There has to be a certain validity carried by the tradition even though it cannot be easily defined.

One particular feature of especially the Italian version of *terra sigillata* is the recurrence of *stamps* placed on items during production. This stamping practice was introduced right from the beginning, and the nature and informative content of these stamps have been widely discussed.⁸ In case of *terra sigillata italica*, stamps basically contain either a name or a graphic symbol, a name being by far the most common. The name can be a single person name like Manneius (*nomen* of the *gens*, or clan) or Synhistor (*praenomen* of a slave); or it could be a longer version of a name like A. Sestius or, in the case of a slave or a freedman, Faustus A. Sestii. Names are also often shortened like S. M. F which is Sextus Murrius Festus. In the case of shorthands, the full names are conjectures, based usually on other stamps with longer versions of the names sharing a similar context, appearing on identical vessels or based on other criteria. The name (or graphic symbol) is placed within a frame that can be circular, moon-shaped, rectangular, or, especially common in later items, *planta pedis*, the form-of-the-foot, a stylized version of the mark left by a bare foot. An example documenting various stamps can be seen in figure 1.

Development of *Terra sigillata* production

Based on a plate found in a ship wreck found close to Marseilles, a *terminus ante quem* for the start of production has been set to 47 BCE. This is based on the identification of some amphoras from the same wreck to a certain M. Tuccius Galeo who according to Cicero died in 47 BCE. Therefore, the production of red *terra sigillata* must have already started by this time.⁹

5 Malfitana 2006.

6 Conspectus, p. 1.

7 OCK², 4.

8 Pucci 1993; Fülle 1997; Nonno 2005; In addition to *terra sigillata*, the stamping practice is common also among other types of production: Malfitana 2006; Manacorda 1993; Steinby 1993; Pedroni 1988; Setälä 1977. Based on these studies, it is evident that there was no *single* practice of stamping as there is no consensus on any single interpretation of the stamps. Each type of production seems to follow its own, internal logic of stamping.

9 Conspectus, p. 39. On the amphoras in the wreck, see Liou 1973. One can of course ask if we really can be sure that the amphoras reading the name of Tuccius really must have been transported immediately after the name was written on them. Also, Ettlinger (Conspectus, p. 6) is of the opinion that this particular item should not yet be counted among full-blown *terra sigillata italica*, and does not come from Arretium, therefore setting the earliest known Arretine *terra sigillata* to around 30 BCE. For the sake of this study, it is not that important whether the origins are around 47 or 30 BCE, and therefore, datings in OCK² are followed.

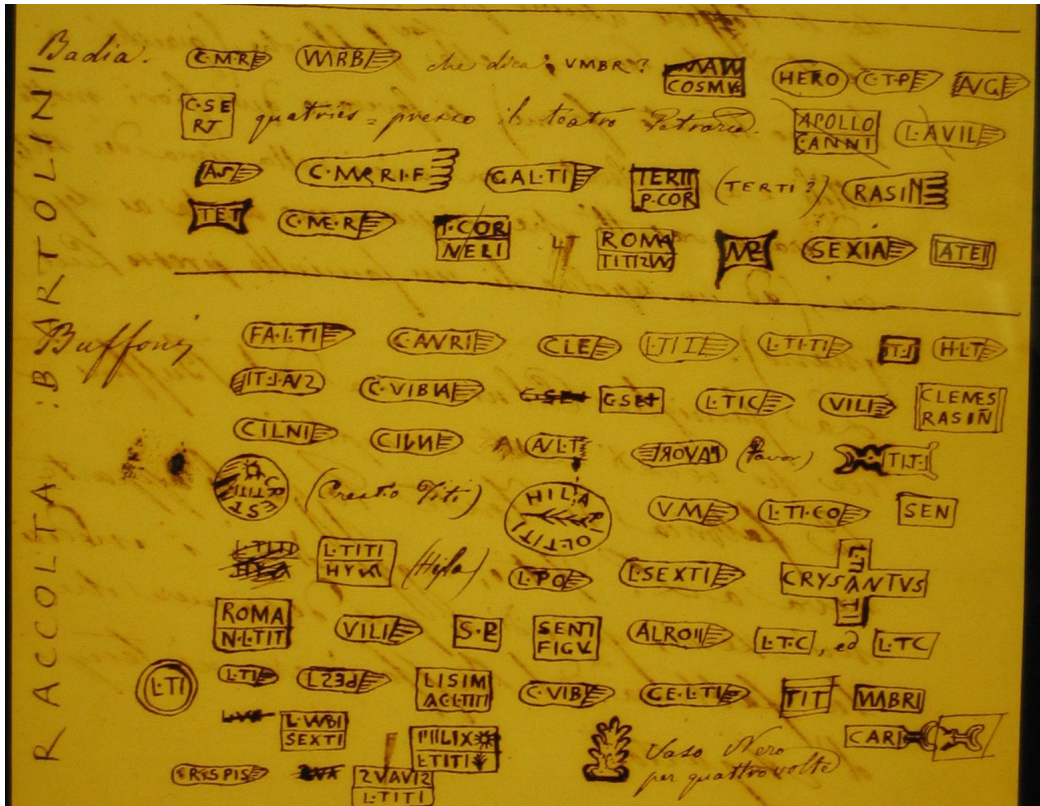


Figure 1.1: Photograph of a terra sigillata stamp documentation showing a variety of stamp forms containing names in different forms. Museo Comunale di Arezzo. Photo by the author.

1. The analysis of terra sigillata distributions

Period	Time
A	40 – 21/15 BCE
B	20 BCE– 15 CE
C	15 – 50 CE
D	50 onwards

Table 1.1: The four main phases of *terra sigillata italica* production, according to OCK², 36.

It is generally accepted that Arretium was the central place of production in the early period. Giuseppe Pucci has suggested that this was a result of the changing tastes of consumers under the influence of Hellenistic pottery, especially the so-called Eastern Sigillata A that has also been found in abundance in Italy.¹⁰

Commonly accepted characteristics of this development are as follows: Production started in and around Arretium in the middle of the 1st c. BCE. After a few decades of learning and development, sale of these vessels really took off, and the production increased rapidly. Soon other areas became involved in production; one of the major sites was Pisa, and soon production expanded also to what are now seen to be the main market areas in Gallia. A major production site was in Lyon with various other sites in the northern provinces. The production in Arretium and Pisa continued with last known production sites still in Central Etruria.¹¹

In Kenrick's reconstruction the development of *terra sigillata* production is divided in phases according to the amount of potters and pots. Phase A (See table table 1.1 on this page.) is dominated by Arretium with numerous potters operating in Central Italy. The large number of active potters in Phase B is explained by the use of slave signatures (i.e. names appearing on stamps are of slaves responsible for some parts of the production) on the stamps; Arretium is still dominant, and the rising importance of Pisa as production centre is evident only in the amount of vessels produced. The early Pisan production was mostly in the hand of *gens Ateius*, and at that time, there were only a few active potters each producing much larger amounts of items than the Arretine producers. The period C sees the disappearance of slave names with the introduction of *planta pedis* stamps on items. The decrease in the amount of potters and items produced is explained by the 'less advanced state' of research in other parts of the Mediterranean, the implied interpretation being that instead of decreasing in number, the production just moved elsewhere.¹² In this period, Po Valley dominates over Arretium although the markets for these production areas are different. In Phase D, the amount of active potters decreases but Arretium and Central Italy still form an important production region. In addition to Arretium, there was production also on other sites in Central Italy and the Po Valley during this initial period of *terra sigillata* production until ca. 15/20 BCE. Especially concerning the North Italian production, it is evident that there were many producers, and that also the Arretine production was a strong influence.¹³

During the next period ca. between 20 BCE and 15 CE, in addition to Arretium, the most important new production places in Italy were Pisa, which belongs to our study area, and Pozzuoli

¹⁰ Pucci 1981, p. 99.

¹¹ Ibid.

¹² What Kenrick means by this 'less advanced state' becomes evident below, when the geographical distribution of OCK² is discussed in more detail; to summarize briefly, Kenrick means that there are large areas of the former Roman world where *terra sigillata* has not yet been studied as extensively as in Italy and France, and correspondingly, publications of *terra sigillata* pottery that could have been used in preparing the database were far fewer, in some regions non-existent.

¹³ OCK², 37–38.

and Cales in Campania. The Pisan production had close links to the Arretine production as Gnaeus Ateius was an important producer at both sites.¹⁴ The production of Ateius will be of particular interest for this study because of its presence at both of the major production sites in the region. In addition, Ateius had strong links to Gallia where stamps bearing his name were used in production both in Lyon and La Graufesenque.

The production saw little change in the next period. Main centres were still Arretium and Pisa, with other sites in Central Italy and the Po Valley. In the last phase of production, Pisa became dominant and Arretium continued to play a role, although minor. Production continued in Pisa at least until the middle of the 2nd century CE.¹⁵

Kenrick's division of the period of *terra sigillata* production in four major phases seen in table 1.1 is mostly based on physical characteristics of items. In phase A, the shapes are not yet standardised, and the fabric varies between red and black; In phase B, the forms have become standardised with hanging lip or vertical rim, and there are yet no *planta pedis* stamps; In phase C, the stamps are mostly *planta pedis*, and the items bear typically applied decoration; In phase D, the decoration is applied and/or the forms are of *Conspectus* form 3.2, in late contexts.¹⁶

These phases will have their relevance later when analyzing the production sites and their development but to demonstrate a general development trend of production, I also want to summarise the data visually. In the database, Kenrick defines the activity periods for potters using textual descriptions. He notes that in many cases the judgements are arbitrary and inconsistent, and should therefore be seen as 'extremely tentative'. He also admits that it is an intentional choice to express these periods in a form that would *not* allow for any automated searching of the database.¹⁷ Disregarding his reservations on the reliability of his datings, this is exactly what I have done to get a tentative overview of the whole data.

In order to achieve this, I replaced all of Kenrick's descriptive datings for potters with numerical values. It soon became obvious that some of the data was not suitable for this as the period of activity for many potters was closed only at one end, for example in the case of a potter that was active from 30 BCE onwards. In this case, there are two options regarding what can be done with the data: in the first one the data is given an estimated end of the activity period; and in the second one, the data is simply left out of the analysis; this is the choice adopted in this study. The main reason for this is that to estimate the length of an average or typical period of activity for a potter is not a trivial operation considering how large is the variation of the data in this aspect. A purely 'typical' number can of course be achieved through a simple statistical operation on the data for which the estimated end of activity is known but I'm personally quite convinced that the variation in the lengths of activity periods is not a random distribution but something more complicated, and therefore to use single value, whether typical, average or median, has a larger probability of introducing a systematic error to the data than what a simple discard of the data would have. Approximately one fourth of the data was thus left out of the analysis but this is also otherwise less useful data for this study as a larger number of known items tends to make the timing of production more certain; and the stamps representing less-known producers with smaller distributions and smaller amounts of known items are also less useful for the analyses performed in the study, so the loss of representativeness is not that significant.

As a result, a simple descriptive bar graph of the amount of vessels produced by potters with definable start and end dates can be seen in figure fig. 1.2 on the next page.

My disregard of Kenrick's warning against using the suggested datings at face value needs to

14 The production and activities of Ateius have been extensively studied, e.g. Kenrick 1997; Bruni 1995.

15 *Conspectus*, p. 6.

16 *Ock²*, 36.

17 *Ock²*, 8–9, 36.

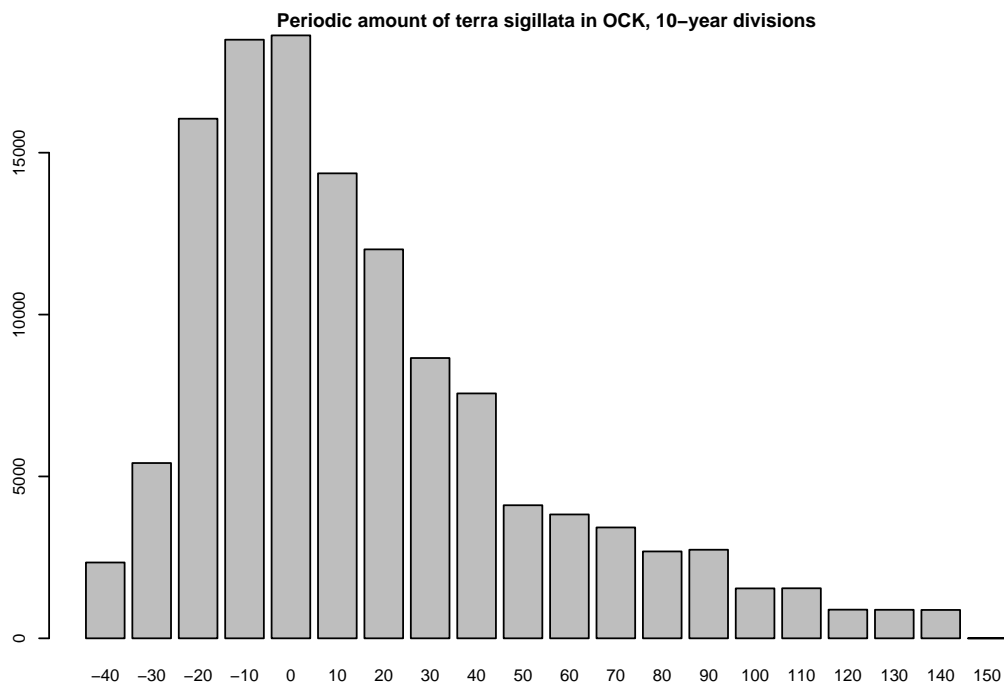


Figure 1.2: Overall view of *Terra sigillata*. Potters without earliest and/or latest possible date are left out. For the rest, it is to be noted that a single item is present in all periods that coincide with the activity period of its producing potter, i.e. a vessel bearing a stamp that was used by a potter from 35 BCE to 5 CE is present in the categories from -40 to 0. Data from OCK².

be explained further. In the case of this work, where the time-span of the study is more or less two hundred years, the suggested datings of Kenrick still provide strong indications of relative timings between different producers' activity periods. Even though there is in many cases not enough data to determine the exact temporal bounds for each potter, *terra sigillata italica* is still so well known that the errors in Kenrick's datings most probably lie within a few decades, at worst, which still is acceptable considering the time perspective of this study.

I would like also to suggest that the estimated dates provided by Kenrick are still in a way systematic so that the errors introduced by them are also systematic and do not disrupt the coherence of the data. The dataset, in my opinion, is internally coherent and so are the results as long as the analysis stays within the data set. To suggest otherwise would be to suggest that Kenrick would have had a personal bias towards some individual potters or other groups in the data; this is hardly credible considering the nature of the data set.

Possible systematic errors and biases in the data will manifest in the cases where the data, and the analysis based on it is set into relation with other temporally defined phenomena, i.e. the historical context. On these occasions, it is important to keep in mind that the structures exhibited by the data may not be temporally as accurate nor as well defined as they may seem. So if based on the pottery data it is demonstrated that something happened e.g. around 40 CE, this should be taken to mean that it probably happened somewhere between 30 and 50, if not between 20 and 60 CE.

To return to the curve produced above (see figure fig. 1.2 on the facing page), we see that the form of this curve is regular. This suggests that our numerical replacement of Kenrick's descriptive periods is acceptable as this curve fits well a general model of the development of *terra sigillata* industry: At first, it starts as a local business producing good quality items. Its reputation spreads and markets expand rapidly. The profitable production and commerce in *terra sigillata* attracts competition whose products are either better, more beautiful or less costly. The production and commerce of *terra sigillata* starts to decline rapidly, but survives well into the 2nd c. CE as small-scale local production.

This curve fits nicely also to the general model of a series of different kinds of ceramics dominating the market. Each dominating ceramics type starts as a small-scale local production, gains market dominance, and after a period of 'fashion', has to make room for the next dominant product.

The corresponding figure is similar to what in marketing studies is known as the 'Bass new product diffusion model', after Frank M. Bass who first presented in it 1969¹⁸. Mahajan, Muller and Bass have jointly called this model a 'model of communication' while it emphasizes the importance of transmission of information about an innovation within a social system. In this transmission, interpersonal communication plays an important role, and as such, the Bass model has all the requirements of being a potentially working model also in our context; in fact it seems that the figure fig. 1.2 on the preceding page presented above is surprisingly similar to the product adoption graphs produced with the Bass model.¹⁹ The main difference seems to be the *terra sigillata* material lingering longer than the consumer durables studied by Bass and others but this can be interpreted through the different nature of current day marketing and commerce where in many cases a survival of a major trade item as a small-scale local product after its market dominance is not really a viable option, especially since 'consumer markets' often tend to be seen as focussing on products of home technology where new products are 'better' and 'more advanced', bringing along functional improvements. The same thing can hardly be said about

18 Bass 1969.

19 Mahajan, Muller and Bass 1995, G80–81; also Bass 2004 demonstrates these curves in the sales figures of the various microprocessor 'generations', each successive generation replacing the previous one.

1. The analysis of terra sigillata distributions

pottery.

The development of the so-called ‘late Italian sigillata’ (*Terra Sigillata Tardo-Italica*) as presented by Pucci in the *Conspectus* seems to confirm this explanation pattern. In Pucci’s narrative, the Etrurian production continues well into the 2nd c. CE, and after Gallic markets were taken over by local production in the 1st c., the markets for the late production are elsewhere: on the Mediterranean coast and in the eastern part of Central Europe, both areas difficult to reach for the Gallic production. This late Etrurian production was exported either by ships from Pisa or other ports on the coast or through Aquileia when marketing it to the eastern zones.²⁰ Recent research especially in the northern parts of the Empire has added to our view of *terra sigillata* production. In some local and regional centres production continued up to the 7th century CE.²¹ The late African production is usually called African sigillata or African Red Slip. In the context of this study, it is not feasible to include these late productions in the analysis.

Geographical distribution of terra sigillata data

A simple geographical analysis of data in OCK² reveals that there is a strong geographical bias in the database. Based on the map in figure fig. 1.3 on page 32 showing the locations of the production sites appearing in the database, it seems evident that the production was limited to Central Italy and the Gallic provinces. This would seem to suggest that *terra sigillata* production was a purely western phenomenon in the context of the Roman Empire.

A look at the amount of items from each province included in the database provides further support for this interpretation (Data summarized in Table 1.2.) Naturally, these numbers are not a true reflection of the distribution of *terra sigillata* in antiquity; and even to call this an approximation would be a grave error as this global (in the Roman context) overview of the database reflects research tradition. The major concentrations of *terra sigillata* pottery are from regions where the excavators of archaeological sites have paid attention to this group of material to the extent that it has been published in the excavation reports. Philip Kenrick, the latest editor of the database, argues himself for this bias resulting from research traditions, and warns against assuming that these distributions reflect the real diffusion areas of *terra sigillata italica* in Roman times. In addition to the tradition-dependency, there are other factors which limit the inclusion of items in the database.²²

In fact, Kenrick summarizes the geographical representativeness as follows:

Gaul and Germany are reasonably well served in this respect, but some parts of Italy (e.g. Samnium, Picenum, Lucania, Calabria and Bruttium) are poorly represented, surely through lack of research rather than lack of trade. Likewise, the large quantities of Italian Sigillata reported from Athens, Corinth and Olympia surely imply that the ware must have been present in comparable quantities throughout much of the Aegean region despite the scarcity of published evidence. (Where are the great cities of the Asia Minor coast, for instance, or Delos, Rhodes or Gortyn?) North Africa, from Africa Proconsularis to Egypt, should also be better represented. (I have seen, for instance, upwards of a hundred stamped vessels in the museum at Lepcis Magna, which unfortunately I could not obtain permission to record.)²³

20 *Conspectus*, p. 16.

21 NP.

22 OCK², 38.

23 OCK², 38.

Roman Province	Amount	Roman Province	Amount
Italia, Latium	6,368	Balears	150
Italia, Etruria	4,611	Cyrene	128
Germania Inferior	3,278	Italia, Samnium	118
Hisp. Tarraconensis	2,133	Asia	106
Gallia Narbonensis	2,063	Italia, unspecified	92
Italia, Venetia	1,841	Sardinia	86
Noricum	1,819	Britannia	86
Germania Superior	1,162	Italia, Picenum	85
Germania Magna	1,045	Corsica	72
Achaea	1,024	Dalmatia	71
Africa Proconsularis	898	Pannonia Inferior	56
Gallia Lugdunensis	810	Syria/Phoenike	45
Italia, Campania	728	Cyprus	44
Italia, Aemilia	618	Mauretania	43
Aquitania	612	Creta	34
Mauretania Caesar.	586	Judaea	27
Mauretania Tingitana	492	Arabia	21
Italia, Apulia	458	Cilicia	19
Gallia Belgica	452	Macedonia	14
Pannonia Superior	369	Italia, Calabria	13
Italia, Transpadana	366	Moesia Superior	11
Italia, Sicilia	362	Moesia Inferior	9
Hispania Baetica	352	Barbaricum Orientale	9
Italia, Umbria	337	Barbaricum Septent.	7
Aegyptus	320	Italia, Lucania	6
Numidia	290	Barbaricum Australe	1
Lusitania	278	Melita	1
Italia, Liguria	260	Caria	1
Italia, Bruttium	166	Lycia	1
Raetia	153	Germania	1
		<i>Unknown</i>	384

Table 1.2: Amount of terra sigillata vessels from each Roman province in the database.

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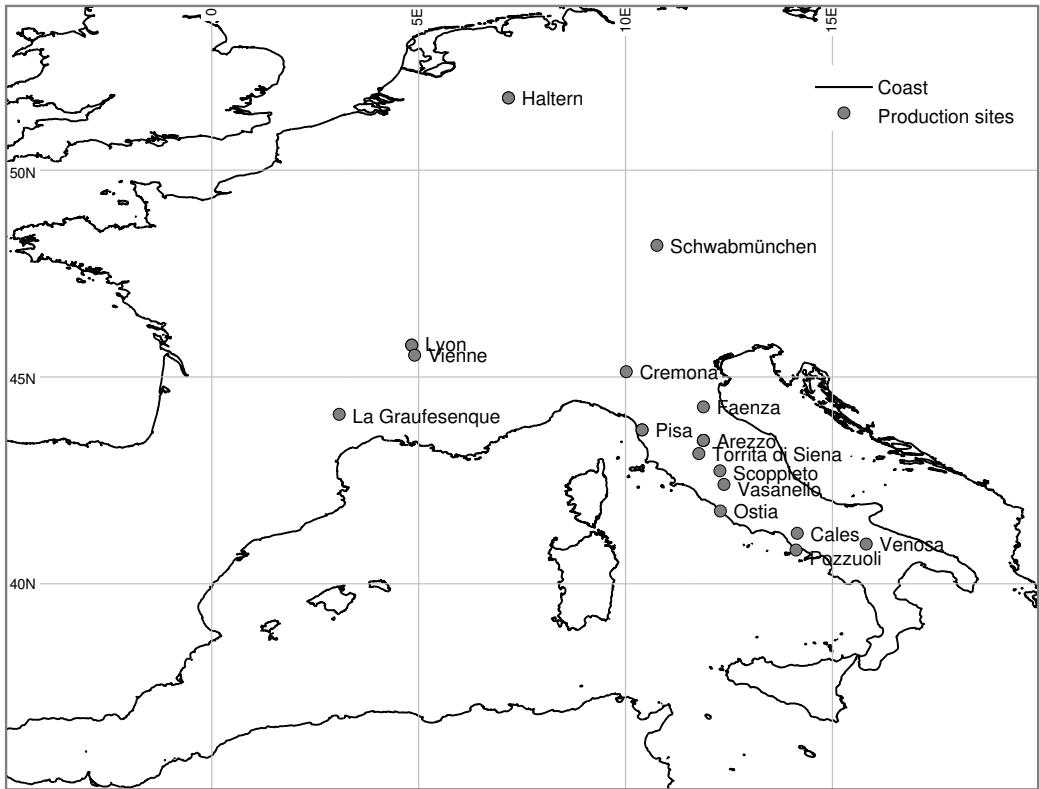


Figure 1.3: Known production sites of *terra sigillata*.

The natural solution to this geographical un-representativeness is to limit the analysis to the provinces and regions where the data seems more credible. On the basis of the table presented it would be easy to select a few provinces or regions with a large amount of *terra sigillata* items and base the analysis simply on them. The inclusion of *Latium* and *Etruria* in Italy seems obvious, as well as *Germaniae*, *Gallia*, the closer part of *Hispania*, and the province of *Noricum*, in the area of today's Austria. Oxé, however, warns against this kind of easy assumption in the case of *Latium* and the province of *Noricum*. In both of these, there is one single site or place which has produced an overwhelming majority of the finds, in *Latium* the city of Rome itself, with 91% of the *terra sigillata* items in the region, and in *Noricum*, the site of Magdalensberg, with 94% of the items from the province.²⁴ The effect of these sites is so strong that nothing can be said of the internal distributions in these regions.

In the light of the regional view of *terra sigillata* data the emphasis of this study on Etruria is evident. This region has a relatively large amount of *terra sigillata* items, and there are many locations with numerous individual finds so that we can speak of a substantial distribution suitable for analysis within the region. In addition, this particular region includes two important known production centres, Arretium and Pisa, so within one culturally relatively homogeneous region (see chapter *Routes of trade and transport*) we find production (see chapter *The social context of Etrurian terra sigillata production* for discussion of this aspect) as well as distribution and consumption (the later chapters of this work).

²⁴ OCK², 38.

Production sites

As is often the case with production, and economy in general, the literary mentions of these practices in classical literary sources are not common. A contemporary record of production of the kind of ceramics we call *terra sigillata* is Pliny the Elder, who records in his *Natural History* how the ware called ‘Samian’ was very famous; the name is derived from the isle of Samos. Also in Italy, there were some places that were known for their ceramics production, like Arretium, Sorrento for its cups, Hasta and Pollentia, and outside Italy, Saguntum in Hispania and Pergamum in Asia. From Plinius it is not evident that the production in Mutina was of the same kind of ceramics as together with Trallis it has *opera sua*.²⁵ A considerably later source about ceramics production is Isidorus, the bishop of Sevilla from 7th century CE, and he cites only Arretium because the ware became to be known as *arretina* as it was first made in Arretium.²⁶ Clearly, an analysis of *terra sigillata* production cannot be based on these sources.²⁷ Luckily archaeological evidence excavations have brought to light many production sites.

A decent and relatively recent summary of the main production areas can be found in *Conspetus*.²⁸ The data used in this study is taken from the database OCK² itself, and interestingly, there is a clear disparity between activity periods of the known production sites and the *terra sigillata* material collected in OCK². Whereas the periods covered by the known production sites and the known items in the database both start around 40 BCE, the production at these sites seems to end considerably earlier than what the items would indicate. Individual production sites hardly continue functioning into the 2nd century CE whereas the tentative periodizations of the stamps by Kenrick go well into the middle of the 2nd century CE (see table 1.1 and the corresponding discussion). In other words, the items in the database and their datings seem to extend the production until the middle of the 2nd century but qualitative descriptions based on research tradition and authors’ personal knowledge put the end of the production earlier.

New research has brought to light new production sites which seem to provide an answer this disparity. For example, both the area of Val di Fine and the production site in Schwabmünchen are late, the Schwabmünchen site even so late as to fall completely outside the range contained in OCK². Neither of these areas is present in the database as the location of activity of a potter, and the finds from Schwabmünchen were not included in the database itself on the grounds that they were not seen as *terra sigillata italica*.²⁹

Production in areas outside Central Etruria started relatively fast. The local production in Lyon has been estimated to start around 20 BCE.³⁰ This is about the same time as the heyday of Etrurian production begins (See respective bar graphs in appendix A). Based on these graphs, it is obvious that while production seems to start around the same time in all the main areas, it actually seems to *end earlier* in areas outside Italy. A *common sense* argumentation would expect a completely different development where production would diffuse from central to remote areas, and continue there perhaps longer than in the central areas; however, this does not happen.

My tentative hypothesis for the overall development of the *terra sigillata* industry is as follows: Production starts in Etruria, probably in Arretium, and results soon in massive exportation of the pottery. Local production, competitive and complementary, started almost immediately, yet

25 *Samia etiam nunc in esculentias laudantur. retinent hanc nobilitatem et Arretium in Italia et calicum tantum Surrentum, Hasta, Pollentia, in Hispania Saguntum, in Asia Pergamum. habent in Trallis ibi opera sua et in Italia Mutina, ... Plin. HN, 35.60.*

26 Isid. *Etym.*, pp. 20.4.5–6: *Arretina vasa : ex Arretio, municipio Italiae, dicuntur, ubi fiunt.*

27 In fact, Křížek 1961 has summarized the literary evidence well, and his discussion of it has been summarized above.

28 *Conspetus*, pp. 4–16.

29 Cherubini and Del Rio 1997, pp. 133–134; Sölch 1999, pp. 107–108.

30 OCK², 28–29.

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because of the manageable transport costs, local products could not supplant imports; also, the Arretine production had the original advantage of higher quality. However, the quality was soon also reached elsewhere. What happens later might be a result of decreasing trade in ceramics; the export of items from any given production area decreases, and this brings with it the results shown on the graphs in Appendix appendix A on page 137. What happens in the northern provinces, might then be not so much a decrease of production in itself but a decrease of products distributed over long distances from the production site. As the contents of the OCK² database are biased towards material found in Italy, the lack of long distance transport from north would result in the apparent lack of northern sigillata even though production still continued, as can be seen for example in the case of Schwabmünchen/Schwabegg.³¹ Also, it would be logical to assume that local production, after securing its position in the markets, would have begun to change, and the disappearance of *terra sigillata italica* in that case would not mean a decrease in production nor in consumption, but a change in the type of pottery; the new type then forms a part of the ceramic assemblages under a different name.

The discussion above also shows clearly that production of *terra sigillata* was very much a matter of Central and Northern Italy and the North-Western provinces.³² Our abilities to analyse consumption of pottery based on the OCK² database are limited because of this geographical bias in the research traditions, but luckily these two areas are also well represented in the recovered material present in the database.

Some stamps and especially names appear both on items produced in Italy and in Gallia. This phenomenon is the subject of a long-standing debate about the relations between these two production areas. For example stamps bearing the name Ateius in one form or another are important in this discussion as we know of five major production areas where Ateius pottery was produced: Arretium, Pisa, Val di Fine, Lyon and La Graufesenque. The stamp OCK² 270 is a good demonstration of the problem. Presentation of its subtypes in the printed part of OCK² takes almost 10 full columns, yet the geographical location of production is still unclear: it was either Arretium, Pisa or Lyon. The similarities of the stamps suggest a strong unity within the Ateius group as is obvious also in the case of stamps 267 and 268 which form a temporal continuum from Arretium to Pisa; this has suggested the interpretation that Ateius moved his production from Arretium to Pisa very close to the year 5 BCE.³³

The productions of Ateius saw a further expansion to Gallia where production signed Ateius has been recovered at production sites in Lyon and La Garufesenque. Based on a study of some moulds found at the production site of La Mulette in Lyon, M. Picon and J. Lasfargues have come to the conclusion that this shop was without doubt a succursal of a shop in Arretium. Two of the fourteen fragments analysed were identical to the ones found in Arretium; a fact that leads them to conclude that there was an obvious business relation between these two.³⁴ Gunnar Fülle is very skeptical about the generality of this phenomenon. In the above-mentioned case he does not deny the link, yet proposes a more varied interpretation of the roles of the actors in the industry. He considers, for example, the possibility that the makers of the items were actually travelling themselves, and that was the reason why production took place in many sites. He notes also that the local landowner, by inviting skilled craftsmen to work on his clay using his ovens, is a much more logical instigator for the production on his own land.³⁵ Kenrick agrees with Fülle

31 Sölch 1999.

32 Strangely enough, the amounts of *terra sigillata* in the OCK² database found in Britannia is almost negligible. This probably does not reflect the situation in Roman times at all, see for example Simpson 1976.

33 Kenrick 1997, pp. 185–186.

34 Picon and Lasfargues 1974.

35 Fülle 1997, pp. 141–144.

on the various interpretative possibilities of organization of production. He also emphasizes that whereas in some cases a common *gentilicium* can be seen to indicate some kind of business relationship, in other cases it might only reflect the origins of the *offinator* responsible for the production. A freedman or a slave with a *peculium* in a faraway place should be seen more as an independent actor than a part of an organised business structure.³⁶ Aubert agrees on this matter, and brings out the point that in the case of moulds and decorative stamps, there is no way to say whether they belonged to a *peculium* or were the property of a freedman whose master had not reclaimed them at the time of emancipation.³⁷

The point of this discussion has been to show that it is not possible *in general* to assume any close operational relationships between remote production sites where stamps using the same *gentilicia* have been found. This should not be taken to mean that there was not relationship at all; we have every reason to assume that the freedmen were still in contact with their former masters, but any analogies to modern international corporations are untenable.

Stamps and Potters

To understand better the *terra sigillata* material used in this study, we need to delve deeper into the meaning of the stamps themselves. What did a stamp on an item mean? Is the reason behind stamping the items connected to production, transport, or trade? Can we see the stamp as a kind of a ‘brand’, labelling the product like an ancient Villeroy & Boch? And are the stamps on *terra sigillata* similar in function to stamps and markings on other types of vessels?

In the case of *terra sigillata* the word ‘stamp’ is used to denote a mark pressed on the item during its production after or during molding, before the item dried, and before it was baked. The stamp therefore is part of the physical item, and not something that can be added later or removed easily. In the context of this work, the concept ‘distribution of a stamp’ means the whole collection of items bearing the same or very similar stamp – the similarity is not limited to the *meaning* of the stamp as in cases of different stamps referring (supposedly) to the same person but the stamps that can be considered identical on the principles that were used in compiling the database:

Ideally, each stamp-type defined in the catalogue should represent a single die. In the case of the more ornate types it is probably safe to assume that this is in fact the case. But there are far more examples of simple types which are prolific and which have few defining features (such as many of the stamps of *Ateius*, *Rasinius* or *C. Sentius*. Here it is impossible to be certain that all of these examples recorded stem from a single die: one can only categorise them as closely as possible. A further and obvious limitation in these cases lies in the nature of the information from which the catalogue has been compiled: one is always hostage to the skill, accuracy and perception of the original draughtsman in the case of drawings and to the faithfulness of scale in photographic reproductions (where indeed uniformity is sometimes neither asserted nor attempted.)³⁸

The placement of a stamp on a vessel is more than just a physical activity of pressing the die to the soft and moist clay. The maker has to choose where the stamps are pressed on the vessel, perhaps which of the possible dies to use, and in some cases, select the visual and textual content

36 Fülle 1997, pp. 141–144; OCK², 48, 50, among others.

37 Aubert 1994, p. 297.

38 OCK², 7.



Figure 1.4: A stamp on a *terra sigillata* mould. Museo Comunale di Arezzo. Photo by the author.

that will be on the stamp. In general, the stamps were pressed on the item when the clay was still soft using a die made of clay, bone or bronze; based on the striations of the stamp background, even the use of wood as a material for the dies has been speculated. A die carved on a fired sherd was probably the most common method, but the finer stamps must be a result of dies in bone or metal.³⁹ All in all, it seems that the physical act of stamping stayed pretty much the same all through the production; at least the database currently does not permit any analysis based on the wear-marks of the dies left on the stamps.

The position of the stamps on the items varies. In the earliest phase of production, the stamps were often placed radially on the floor of the vessel. This practice may have been inherited from the Hellenistic black-slipped ware that was often stamped with palmettes and other devices. The stamps in this case were used also as decorative as there can have been no need for this many stamps on one item.⁴⁰ The stamp placement changed as the stamps themselves took more simplified forms. The stamps lost most of their graphical qualities, and they began to contain only abbreviated forms of names; at the same time, they got smaller, and their positioning lost any decorative aspect. What has to be noted, however, is that they were not deliberately hidden either. In many cases, where it would have been perfectly possible to place the stamp on the bottom of the vessel, they were pressed on the sides of the vessel, among other decorations.

The practice of stamping should also be interpreted in the context of earlier ceramics production in the same larger region. Stamps appeared first on black-glazed table ware in the end of the fourth century BCE, but the practice disappeared by the end of the 2nd century. Stamps reappear on the Arretine black-glazed vessels in the second half of the 1st century BCE, and as this production was a direct predecessor of *terra sigillata*, the stamps continue an existing tradition.⁴¹

There are various theories about what the stamps actually meant, and why stamping was practised in the first place:

1. The stamps were used to identify the work done by individual potters in the production process;
2. The stamps were used to separate production by potter when the vessels were fired in shared ovens;
3. The stamp was used as a brand, indicating a supposed level of quality to the buyer.⁴²

There are arguments to support and discredit each and every one of these three models. As rightly noted by Kenrick, 'there is no necessity for different workshops to have used them with the same intent'.⁴³ That this is really the only valid conclusion is easy to see when looking at the differences in stamping practices.

First of all, not all items were stamped. This would not be a problem if only a part of the items were stamped because then a reason deriving from production practices would be easily acceptable. A rare stamp here and there would point to one 'marker' to identify the person responsible for the production of the set; but in this case, one would not expect more than a smallish percentage of stamped items. This is not the case, however. Of the almost one thousand items of *sigillata italica* found in Pompeii and Herculaneum, only 50 do not bear stamps; at the

39 OCK², 12–13.

40 OCK², 11.

41 Pucci 1993, p. 73; Fülle 1997, p. 118, see below for a fuller discussion on this tradition.

42 The most thorough discussion, with a very skeptical undertone, is still Pucci 1993. Additional arguments have been presented by Fülle 1997 and Kenrick in OCK², but the interpretative options and problems presented by Pucci are still valid.

43 OCK², 10.

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Stamp	Location	Period
242	Pozzuoli	10 BCE to 10 CE
243	Po Valley	30 to 1 BCE
244	Unknown	15 BCE to 15 CE

Table 1.3: Production periods for the OCK² stamps 242, 243, 244.

large scale production site in Magdalensburg, there were around 1600 stamped vessels and only 117 without stamps; In Haltern, almost every item was stamped; and all the non-decorated items in Corinth were stamped.⁴⁴

Had the stamp been used as a brand, one would expect that every item had been stamped, but this is not the case either. In the southern Gallic and Hispanic production, stamping seems to depend on the form of the vessel – some forms have stamps almost always, others only rarely. In addition, the amount of stamps changes over time. And in the North-African production, the stamps were used not at all.⁴⁵

But in some cases it is obvious that the content of the stamp was meant to be read by the buyer of the vessel. The stamps *Scottius fecit aretinum* and *Rutenos fec(it) aretinum* come from workshops in southern Gaul.⁴⁶ The stamp type OCK² 242⁴⁷ was used in Puteolian (modern Pozzuoli) production, and OCK² 243⁴⁸ somewhere in the Po Valley. The stamp OCK² 244, on the other hand, is formed by various forms of *arretinum* of unknown production location. It is striking that there is no evidence of genuine Arretine production actually ever using *arretinum*. Also, all three cited stamps from OCK² belong to the time when *terra sigillata* production was at its peak (see table table 1.3 on this page and figure fig. 1.2 on page 28). In these cases, it is obvious that at least the stamp was something the buyer was supposed both to look at and to understand as some kind of a mark of origin.

Pucci argued that the stamps could not work as ‘brands’ because they were not always decodable by the potential reader.⁴⁹ Kenrick notes, however, a working analogy to the current world where very few people are actually able to decode some of the famous brands to the original meaning of the word. How many actually know, what FIAT or IBM originally meant? To decode the original name behind L.R.PI was not necessary if you just knew to connect that acronym with a good quality product.⁵⁰ And in fact, as we saw above, sometimes the stamp was clearly meant to be read and understood, as was the case with the stamps proclaiming arretine origin – whether this was supposed to mean the production place or only to indicate the type and quality of the item is debatable.

The most popular explanations concerning the practice of stamping seem to link it with the production chain of the items. Besides the control of production by underlings, for which the stamps would have been naturally useful, they could also have been used to mark one’s products in the big, shared kilns. There is evidence of separate firing facilities, at least in Torrita di Siena and la Graufesenque, and had the firing been externalised from the actual pot making, it would have been necessary to mark one’s products for firing, especially if the kiln owner was an

44 Pucci 1993, p. 74.

45 Ibid., p. 74.

46 Ibid., p. 75.

47 ARRETI; ARRE

48 ARRETINVM; ARRETI; ARRET

49 ibid., p. 75

50 OCK², 12.

independent entrepreneur specialised in firing; or the contents of one firing session might have formed one set, already sold for a *negotiator*, in which case the stamps would have facilitated the division of the profits from sold items.⁵¹ But in this case, one would expect – as noted above – to find a stamp on every item.⁵²

Another strand of explanation is based on legislation. It sees the disappearance of the stamps on the earlier black glaze pottery at the end of the 3rd c. BCE as a result of the plebiscite restricting the economic activities of the senatorial class, and the re-appearance of the stamps as a result of Caesarian legislation (*lex iulia repetundarum*) in 59 BCE⁵³. As Pucci and Fülle rightly note, there is no evidence of any senatorial involvement in the production, and there was no evidence of the limiting legislation ever having been extended to include others than the senatorial order.⁵⁴ The disappearance and reappearance of the practice does coincide well with the known legislation, however, but a purely causal explanation is probably out of order in this case. In my opinion, the main problem of this explanation is that it does not actually offer any new explanations for the stamping itself. Why would a senator be more likely to stamp his production than someone else? Why would the producers being of the senatorial order be enough of an explanation for the practice of stamping? The logic behind this seems to suppose an inscriptive obsession, senators inscribing everything they could put their hands on unless expressly prohibited by law.

In the end, it seems that to look for one comprehensive meaning for the practice of stamping does not seem to pay off. Each of the possible interpretations presented in the discussion can be countered with some actual examples of stamps that do not follow the logic of the interpretation. So perhaps we need to look at the problem from a slightly different angle? The different interpretations for stamping are not mutually exclusive, and in many places, the stamps might well fill multiple functions – and not only in the minds of the pot-makers. After all, they only had the control of their products to a certain point after which it was the processes of transport, delivery, and markets that took the items out of their control. A logistical stamp imprinted for the need of accounting can quite as well mean other things later on in the life of the item.

In their comparative, although quite superficial, analysis of potential brands in history, Moore and Reid list various examples of brands, and what they call ‘proto-brands’ before modern times. The earliest examples of logos and brands very much like the terra sigillata stamps come from the Indus Valley and the Harappa culture where hundreds of stone seals have been recovered. The purpose of the seals was either to identify the sender of a particular piece of merchandise or to identify the authority on which the carrier of the stamps acted. But the most interesting argument in Moore and Reid’s contribution is the understanding that for a brand, you don’t need a logo: for example, the Cypriot copper was recognized everywhere without any stamps nor labels identifying it as such, and the same went for the later Phoenician red-slip pottery and purple-dyed garments. In addition, Moore and Reid identify a third specifically Phoenician brand – the religious cult of Melqart.⁵⁵

In their conclusion, Moore and Reid summarize the characteristics a brand in general is supposed to carry to two categories, each with three sub-categories:

1. Information

a) Logistics

51 Pucci 1993, p. 75; Fülle 1997, p. 117.

52 The level of organization at the La Graufesenque -site is considerable. The firing ovens were capable of firing thousands of items at the same time, and the surviving firing records from the site indicate an organized firing process. Marichal 1988; Fülle 2000a; Fülle 2000b.

53 Pedroni 1988.

54 Fülle 1997, p. 117; Pucci 1993, p. 73

55 Moore and Reid 2008, pp. 422, 426.

1. The analysis of terra sigillata distributions

- b) Origin
- c) Quality

2. Image

- a) Power
- b) Value
- c) Personality

The order of these is significant in Moore and Reid's analysis as exactly this ordering allows them to construct a grand narrative of the brand functions from the Indus Valley seals to modern day brands. As such, it should be taken with a grain of salt but the functions a brand can have are still valid.

Somewhat contrary to the individual analyses, Moore and Reid summarize their results so that the so-called 'proto-brands' of the ancient civilizations emphasizing the informational functions of the brand whereas the modern brands make more of the image-related meanings of a brand. Thus, although in the analysis of the Corinthian pottery they do admit strong image-related functionality in the makers' inscriptions on the pots, in the end, images of power, value and personality are still reserved for the modern day brands.⁵⁶ This kind of grand narrative with historical development along one axis to a single direction is hardly credible but the functions Moore and Reid attribute to brands are still quite valid and interesting.

The stamp on a *terra sigillata italica* item is not a result of any single, easily explainable practice. In some cases it obviously has something to do with the production process, in other cases it does have decorative meaning, and the marketing aspect cannot be ignored, either – already the existence of some stamps with clear marketing intent is enough to demonstrate that the potential buyer was expected to look at the stamp as an indicator of something. What could this something be? Arretine origin? ('Oh, these are of the Arretine type, they are good!') Or a certain producer? ('My sister bought some cups by this L.PO.ZOS and not one of them has broken yet!') Whichever, this meaning may have been intended ('We'll put ARRET on these plates so everyone things we're making these in Arretium even though were sitting here in the *suburbia* of Puteoli') or unintentional ('Since that lazy Hilarius is also making these plates I'll mark mine with CN.ATEL.XANTI so the master knows how many of the plates I've made and how good the plates I made are!'). The possibilities are myriad; but in spite of all these interpretations of the stamping practice, the stamp still preserves its most useful feature (to us): it connects each item with a single production place. Often this place is also known.

Etruria

We should not fall into the trap of defining trade as long-distance transport of items on ships by default; in that case, we would be just proving that assumption instead of trying to understand trade in pottery on all levels. An important part of this study is the analysis of *terra sigillata* trade on a regional level. For this purpose, I have selected the region of Roman Etruria, corresponding to the Augustan *regio VII*. The reasons for selecting this region as a unit of analysis are simple.

First of all, the production of *terra sigillata* started within this area. This region also contains a large amount of known production sites, some of them major centres of production all through the period. Second, this area includes a large amount of finds from many different locations. The

⁵⁶ Moore and Reid 2008, pp. 427–428, 430.

archaeological tradition is relatively similar over the region, so we can assume that the formation processes of the collections of known items are so similar that their effects can be ignored.

Third, this area forms a geographically definable unit. It is limited to the west by the sea and to the north and east by the Apennine mountains which all form natural barriers for movement. To the south, the limit is not so clearly defined but in practice I draw the line somewhere between Veii and Rome. It could be argued that Rome itself was such a major element in consumption of pottery that its effects should not be ignored but the purpose of this study is to analyse regional practices, and in a way, including Rome in the analysis would necessarily turn the study into the analysis of 'global', empire-wide, practices.

As the object of study is the geographical distribution of a ceramic type, the data to be used in the analysis must meet certain criteria. The most important of them is that there must be enough finds from different locations to give as a *distribution* instead of a just few locations. The obvious solution to this problem is to use in the analysis only items that were found in many places, i.e. that easily give off a distribution. However, this solution is not without problems; one of them is that this assumption on the relevance discards completely the possibility that there might be items that were produced in large quantities but never distributed widely. Therefore, to concentrate only on the amount of places where the stamp has been found would be misleading in the same way as would be misleading to select the stamps only based on the amount of items found without regarding the places they were found in; this would favour stamps that did not distribute widely, yet were popular locally.

A combination of these two criteria could be reached either with a *union* or an *intersection*. The latter would consider only items with stamps that were both present on a large amount of items and found in many locations whereas in the former either a large amount of items bearing a stamp at one location or a wide distribution of items even in small numbers would be enough for inclusion in the study. I have opted for the former as there is the possibility that both wide and concentrated distributions could reflect different production locations or different periods of activity, making both groups interesting. Repeated selection process and the practical matters of being able to handle and analyse the amount with relative ease and flexibility made me define a twofold criterion as follows: If the products bearing one stamp either appear on 10 or more sites or if there are 75 or more items bearing it found in all of Etruria, the stamp is included in the study. This resulted in altogether 25 different stamps, plus the category of the unattributable which will be dismissed from further analysis.

An overview of the resulting dataset is in table 1.4, and a simple scatterplot of the values in figure 1.5 clearly show that there is no obvious, simple relation between these two variables.

Although I concluded earlier that we cannot use the *gentilicia* as any sure indicator of business relationships, it is obvious from this material that some *gens* were dominant in the *terra sigillata* market. The names Ateius, Clodius, Cornelius, Murrius, Perennius and Rasinius appear more than once in the list. Each of these shows a geographical and temporal unity that in my opinion points in the direction of unity also in the matters of business practice.

Basic distributions

The distribution maps for all the selected potters within Etruria can be found in appendix E. These provide us with a basic idea of how the products of different potters were distributed within Etruria.

In the following I will present a simple visual analysis of these distributions, and a classification of the potters based on their distribution on these maps.⁵⁷ As the numbers of items for each potter

⁵⁷ For further analysis, the reader is advised to bear in mind that these maps do not show the *complete* distribution of

Table 1.4: List of all the potters that fill the selection criteria. Along with the potter number that corresponds to the numbers in OCK², the table shows the full name of the potter, the location of activity, if known, the amount of sites within the Roman Etruria where items bearing this stamp type have been found, and the total number of items bearing this stamp found in Etruria. The last item is the interpreted period of use for each stamp.

Stamp	Name	Location	Sites	Total	Active
183	SEX. ANNIVS	Arretium	10	42	20 BCE – CE 10
267	ATEIVS	Arretium	4	388	15 – 5 BCE
268	ATEIVS	Pisa	8	155	5 BCE – CE 25
270	ATEIVS	Arretium/Pisa/Lyon	15	75	15 BCE – CE 30
275	CN. ATEIVS	Arretium	6	158	15 – 5 BCE
278	CN. ATEIVS	Arretium/Pisa/Lyon	13	43	15 BCE – CE 50+
371	AVILLIVS	?	10	43	20 BCE – CE 40
514	CAMVRIVS	Arretium	18	154	CE 30 – 70
589	C. CLO(DIVS) SABI(NVS)	Arretium	11	86	2nd half of the 1st c. CE
592	P. CLOD(IVS) PROC(VLVS)	Arretium	5	83	CE 40 – 100
623	P. CORNELIVS	Arretium	4	83	5 BCE – CE 40
624	P. CORNELIVS	Arretium	8	103	5 BCE – CE 40
879	L. GELLIVS	Arretium?	14	82	15 BCE – CE 50
933	P. HERTORIVS	Arretium	12	84	30 – 10 BCE
1212	SEX. M(VRRIVS) FES(TVS)	Pisa	16	137	CE 60 – 150
1213	SEX. M(VRRIVS) P()	Pisa	10	35	CE 60 – 150
1342	C. P() PI(SANVS)	Pisa	13	92	CE 50 – 100+
1390	M. PERENNIVS	Arretium	13	99	15 BCE – CE 60
1391	M. PERENNIVS	Arretium	6	81	20 BCE – CE 20
1404	(M.) (PERENNIVS) BARGATHES	Arretium	10	38	CE 1 – 30?
1623	RASINIVS	Arretium	16	164	15 BCE – CE 40
1690	L. RASINIVS PISANVS	Pisa	20	203	CE 50 – 120
2109	L. TETTIVS SAMIA	Arretium	15	79	20 BCE – CE 5
2373	C. VIBIENVS	Arretium	12	82	CE 1 – 40+
2441	VMBRICIVS	Arretium?	13	71	10 BCE – CE 50+
2585	Unattributable	?	10	77	?

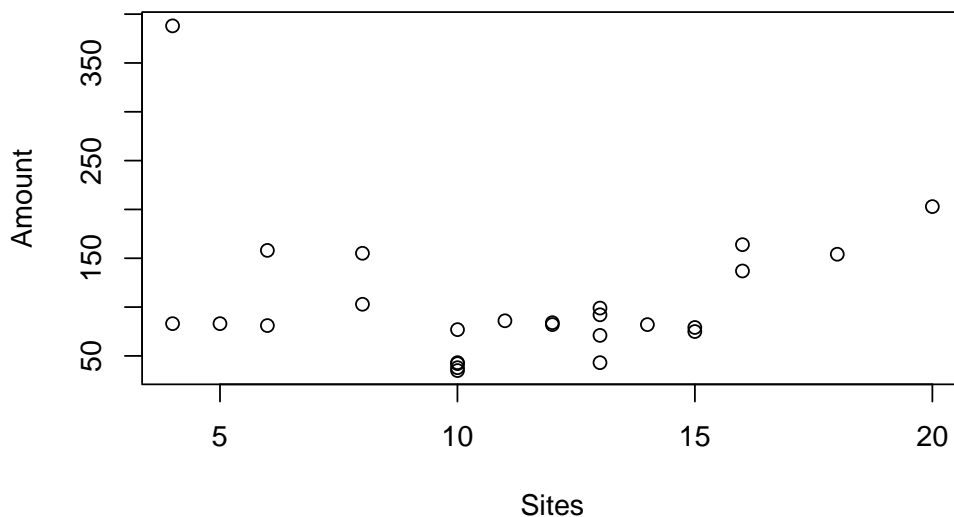


Figure 1.5: A simple scatterplot showing the relations between the number of sites and amount of finds.

are not a reliable indicator of really anything (see the beginning of this chapter for a discussion on the meaning of the amount of items), the number has little bearing on this classification; some effect it gains through the visual importance attached to bigger circles as compared to smaller ones when doing this kind of a purely visual analysis. Each potter's distribution can be said to be present or absent in two overlapping spatial divisions: inland vs. coast and south-east vs. north-west. The high lands between the coast and the major river systems of the region divide the area into coastal areas and inland, and the division between NW and SE is evidenced by the boundary between the rivers Arno and Tiber at Arretium (See map 1.6 for an overview of the land forms of Central Italy). In the coastal regions, the division between NW and SE is not as easy to define but is still quite evident in the material. Additionally, I have included the variable 'many places' which I have crossed in the cases where this potter's products have been found on many sites as opposed to only a few – a very subjective estimate but very evident on the maps. The results of this classification can be seen in table table 1.5 on page 45.

Of notable interest in this table are for example the following phenomena:

1. The group A has a distribution only in the north-west. The items are usually found at many sites, and they are always produced in Pisa. A natural interpretation is that these were marketed locally, and therefore were not part of a larger business network operating in Etruria.
2. The groups C and Ca have a distribution in the inland areas, mostly in the valleys of the

these potters; these kind of tables are available in, for example, Mees 2011. As the main object of this study is to study regional practices of trade and transport, these maps are limited to the selected study area.



Figure 1.6: Central Italy. Contour lines in gray. Coast line and major rivers in black.

Group	Potter	NW	SE	Coast	Inland	Many places	Production place	
A	1212	x		x		x	Pisa	
	1213	x		x		x	Pisa	
	1342	x		x		x	Pisa	
	1690	x		x		x	Pisa	
B	270	x	x		x	x	Arretium/Pisa/Lyon	
	278	x	x		x	x	Arretium/Pisa/Lyon	
	2109	x	x		x	x	Arretium	
Ba	268	x	x		x		Pisa	
C	514		x		x	x	Arretium	
	589		x		x	x	Arretium	
	624		x		x	x	Arretium	
	879		x		x	x	Perhaps Arretium	
	933		x		x	x	Arretium	
	1390		x		x	x	Arretium	
	1623		x		x	x	Arretium	
	2373		x		x	x	Arretium	
	2441		x		x	x	Arretium	
	Ca	183		x		x		Arretium
		267		x		x		Arretium
275			x		x		Arretium	
371			x		x		Unknown	
592			x		x		Arretium	
623			x		x		Arretium	
1391			x		x		Arretium	
1404			x		x		Arretium	

Table 1.5: A simple analysis of the distribution patterns of individual stamps within Etruria. The stamps are grouped together based on the they show in the columns of the table.

1. *The analysis of terra sigillata distributions*

Tiber river system, and in the cases where the production site is known, it is Arretium. Almost half of the potters are such that their products can be found only on a few sites (group Ca), yet usually some sites have a lot of their products. Interpretation for this group is very similar to the group A: the items are local products that were marketed locally, and did not belong to any larger business operations of networks.

3. The group B and its affiliate Ba have a wide diffusion over all inland areas of the region but rarely that much on the coast outside the Pisa neighbourhood. The production place is not easy to fix. In two cases the potters moved their production from one place to another (potters 270 and 278, both members of the Ateius-group), finally ending all the way to Lyon. One interpretation for this group is that the items were from the start more or less aimed for export via Pisa, and in the end, also produced there. However, the continuing distribution of these items along the Arretium–Pisa-axis suggests that some parts of the operations stay back in Arretium. In any case, these stamps could be counted among the products of a larger enterprise.
4. It seems that a coastal diffusion presupposes a production at Pisa. This is hardly surprising if we assume both the existence of small-scale coastal trade using ships and the difficult route over the highlands from the interior.
5. It also seems that a diffusion in the Arno valley supposes a production location at Pisa. We might be able to differentiate between the upper Arno valley and the lower one of which the lower one is clearly dominated by products from Pisa; the upper Arno valley sites, notably Fiesole and Florentia, see an occasional item produced in Arretium. This is somewhat surprising as one might imagine that it would be as easy to distribute material from Arretium down the Arno as it seems to be to distribute it do the Tiber valley.
6. With the exclusion of the members of the group B & Ba, the Tiber valley is dominated by products from Arretium. This is hardly surprising, as Arretium lies at the top end of the navigable river network covering the whole valley. However, as the distributions of these groups (C & Ca) are not limited exclusively to the Tiber valley, we cannot just assume that the river was the transport route here.

Based on these observations, it can be safely stated that geography had something to do with the diffusion of *terra sigillata* in the study area. The position of the Arretine production in the inland trade and the dominance of the Pisan production in the coastal trading patterns are both relatively natural and understandable in the context of premodern, technologically limited transport methods. There does not seem to be anything worth calling a ‘problem’ in the patterns demonstrated above, and a superficial investigation of the data does not seem to reveal anything worth studying further in it. However, as will be shown in later chapters, things are not quite as simple when a) temporal development are taken into account; and b) the geographies of transport are investigated in somewhat more detail.

At first, however, the apparent homogeneity of the data needs to be challenged starting from the beginning, namely production. This will form the main subject of the next chapter.

2

The social context of Etrurian *terra sigillata* production

Producers of *terra sigillata* and their socio-economic situation

Persons appearing on stamps of *terra sigillata* vessels generally do not appear in literary sources (but for Ateii, see later). However, considering the *gentilicia* of our selected group (see table 1.4 on page 42), we find out that many of them are relatively common.

There are various potential candidates for an inscriptional connection: An urn found close to Monte Sansavino in Arretium bears an inscription L · AVILLIO // PROCULO¹ that might be connected with a certain L. Avillivs²; also, we have a sarcophagus with two inscriptions found outside but close to Arretium, with one of the epigraphic fragments referring to C. Memmius Felix.³ A certain C. Memmius⁴ had a slave producing *terra sigillata* called Felix, using the stamp FELIX // C · MEMMI⁵, and who, if freed, might well have adopted as his name C. Memmius Felix, meaning that the person dedicating the sarcophagus to his friend might well be C. Memmius' former slave who started his career by making pots. The only problem is that the sarcophagus is dated with a Hadrian coin found in it which gives it an obvious *terminus post quem* at Hadrian's reign, and the production of C. Memmius has usually been dated somewhere between 20 BCE and 20 CE. Considering that *terra sigillata* production in general was already dwindling in the region during Hadrian's reign (117–138 CE) it is not very likely that these two sources refer to same person.

The *gens Memmia* is not unknown in Italy. It was of plebeian origin, and produced many tribunes during the late Republic, like one C. Memmius who was *tribunus plebis* in 111 BCE, and C. Memmius, the *tribunus plebis* of 66 BCE who made enemies with both Pompeius and Caesar, emigrated and died around 49 BCE.⁶ Especially the later one of the tribunes might provide a possible connection to the Arretine case as he was married to Sulla's daughter Fausta, and thus it is entirely possible that also he received some land here in Sulla's redistributions (see below). The somewhat later case of slave Felix cannot be *directly* connected to this Gaius Memmius as he was dead already at the time Felix was active, but for example his grandson might well have been the original owner of Felix C. Memmii, the later C. Memmius Felix.

1 CIL, XI, 1853.

2 OCK², 403.

3 CIL, XI, 1881.

4 OCK², 1138 to OCK², 1158.

5 OCK², 1146. The fact that Felix was a slave of a Gaius Memmius is evident from the form of the name on the stamp. The slave name 'Felix' is in nominative and the name of the owner follows in genitive; this is a very common combination on stamps.

6 For some Memmii, see OCD and OCD.

2. The social context of Etrurian terra sigillata production

Within the scope of this study, it is not possible to go into a detailed analysis of the *gens* appearing in the OCK² database. What can be done, however, is a study of the context of the emerging *terra sigillata* production in Etruria, especially from the point of view of economic and political context.

‘Why economic and political?’ one might ask; the reason for this is not a denigration of the cultural nor it is a claim that economics and politics are more important than culture. Rather, it is the other way around. Culture provides people with models and mentalities, ways of understanding the world and envisaging themselves in it; therefore, all economic and political actions are in the sense ‘cultural’ that they are ‘culturally defined’ or ‘constructed’, and as such are a result of cultural norms and values.

However, it is not ‘culture’ that makes these actions happen. ‘Culture’ is what gives them form and meaning, and makes them performative in the sense of expressing actors’ view of proper, productive activities. Structures of what we call social and economic are a product of repeated applications of cultural values and norms in action. We could choose to discard these concepts completely but this would be too rash. Both ‘social’ and ‘economic’ have been used very fruitfully in studies for decades, and our understanding of the late Republican and early imperial period is very much a product of their application. It would naturally be possible to rewrite this understanding from a purely cultural viewpoint in which case ‘social’ and ‘economic’ would become artificial constructs that could be replaced by well-formulated cultural reasoning. However, this rewriting has not yet been done, and this study does not intend to be the first to do so. Instead, I’m adopting the usage of the concepts of ‘social’ and ‘economic’ for the depth of meaning and analytical power they carry with them and for the easy access they give to a long tradition of research. Therefore, in forthcoming discussion actors are seen as situated in a politico-economic (and social) narrative: what happens around them.

The story begins with Sullan colonizations. Etruria had been a Marian stronghold, and saw much fighting during these years. After the victory of Sulla, his armies needed to be settled, and the obvious source for land were the areas that had offered the strongest resistance to him earlier. Full story of this process in the parts relating to Etruria can be found elsewhere⁷ but some main points are worth repeating here.

Arretium, one of the main sites of production, was punished quite severely for having been one of the towns supporting Marius. Main source for this information is Cicero who writes in a letter to Atticus how he has proposed regarding *lex agraria* that possessions given by Sulla to his men should be confirmed, and that people of Arretium and Volaterrae should be allowed to retain the holding of their lands which were made public by Sulla.⁸ It was clear, then, that the Sullan colonization and land assignments had been performed, and never revoked afterwards. Sullan veterans were more or less still living where they had been settled. On the other hand, the fact that Cicero has even brought up this point shows that the people of Arretium, even though originally punished by the confiscation of their land, had lost that land only partially.

As Harris shows there is other evidence to confirm the presence of a Sullan colony in Arretium.⁹ Pliny the Elder, in his list of towns, mentions three sets of *Arretini*, *Veteres*, *Fidentiores*, and *Iulienses*.¹⁰ Harris explains these as describing the three parts of the Arretine population: *Veteres* were citizens of Arretium before the Sullan colony; *Fidentiores* were then new colonists settled there by Sulla; and *Iulienses* are the results of a Caesarean colony or Augustan settlement. In support of this interpretation there is the evidence in the *libri coloniarum* which refers to an

7 Among others, notable are Harris 1971, pp. 259–267; Papi 2000; Santangelo 2007.

8 Cic. *Att.*, 1.19.4.

9 Harris 1971, p. 286.

10 Plin. *HN*, 3.27.

Augustan colony but Harris discards this possibility on the grounds that Pliny does not say that Arretium was a colony.¹¹ It is also quite obvious that Cicero considered Arretium a colony when describing the Catilinian army of the colonists from Arretium and Faesulae.¹²

It is obvious that the defeat to Sulla was going to bring many changes for the town, and we probably can assume that there were Sullan veterans moving to the town after the war. The large part of the former town territory left unassigned and still occupied by its former owners that is evident in Cicero's letter indicates that the influx perhaps was not as dramatic as it could have been or perhaps what had been planned. It seems that even after the arrival of the Sullan veterans, who perhaps dominated the political life of the town at least for a while, the former Arretini were able to continue living relatively undisturbed.

Of course the effects of Sullan colonizations were not limited to Arretium. Volaterrae was the last stronghold of the Marians anywhere, and the town was taken back only in 79 BCE, during the consulships of Appius Claudius Pulcher and Servilius Vatia.¹³ The town had gathered the remains of the die-hard opponents of Sulla, and consequently, the treatment of the town was harsh. In addition to the territory, Sulla proposed to the people that the inhabitants of Volaterrae should be deprived of their citizenship.¹⁴ This was something quite unusual, and we learn from Cicero that although the decree was at least nominally passed, it was not self-evidently assumed to be valid. Cicero, patron of Volaterrae, defends a member of an important Etruscan family from the town in a litigation case over a piece of property. Aulus Caecina had been given a piece of land, *fundus*, as legacy, and the litigation was about whether he was entitled to accept this legacy at all, not being a citizen after the Sullan deprivation. Cicero claims that it actually was not possible to take away Roman citizenship, it could only be given up voluntarily.¹⁵ As the situation at this point was obviously not clear, we can make two conclusions of the whole situation:

First, that the Volterrans had not suffered from practical limitations this far. Since the situation was unclear at the time of *pro Caecina* and the litigation, no one was assuming that the Volterrans were citizens; also the opposite is true: nothing had yet happened which would have enforced their citizenship in practice during these years.

The first conclusion points to a second one: Volterrans did not have that much to do with the Romans, at least not with the Romans at Rome. The *pro Caecina* was given in 69 BCE, which was ten years after the sack of Volaterrae by the Sullan army. It seems that during this time, the contacts between the Volterrans and the Romans were not too common. On the other hand, we have to remember that Cicero was a patron of Volaterrae, so some contacts there must have been.¹⁶

Concerning the land and property of the locals, there were large scale confiscations of land in the Volaterran territory. In the end, it seems that they were never really redistributed, as pointed out by Cicero and mentioned above, and also supported by the lack of known traces of centuriation in the Volaterran territory. Any large scale land assignments would most probably have led to a centuriation of the land to be assigned. Pasquinucci and Menchelli note that we do not of course know the whole territory yet, and that the *liber coloniarum* does point to centuriation in the territory.¹⁷ The fact that the known part does not show traces of centuriation

11 Lib. Col. 215.3. Plin. *HN*, 3.27; Harris 1971, pp. 306–313. Harris clearly finds Pliny more reliable than the *libri coloniarum*, a fact that is obvious if one sees how the discrepancies between these two sources are handled in the case of the Augustan settlements.

12 Cic. *Mur.*, 24.49 *Catilinam* ... *circumfluentem colonorum Arretinorum et Faesulanorum exercitu.*

13 Granius Licinianus, 36.38

14 Cic. *Dom.*, 30.79.

15 Cic. *Caecin.*, 33; Santangelo 2007, pp. 174–176.

16 The particular position and traditions of Volaterrae have been analyzed in Terrenato 1998.

17 Pasquinucci and Menchelli 1999, p. 131.

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can be safely assumed to indicate that at least major parts of the territory were never in practice assigned to any new colonists.

But the effects of the Sullan campaigns were not limited solely to confiscation and deprivation of rights: in many places, it probably was just the destruction and havoc caused by the warring troops which affected the local populations. Other known battle sites where the destruction was considerable are for example Populonia, Telamon and Saturnia. At Populonia, the sacking of the town led to a complete destruction of the acropolis which had just seen extensive renovation; it was never rebuilt. Telamon was ravaged, and at Saturnia there are traces of a sack and a reconstruction from this period.¹⁸

A different case yet was Faesulae. It had also been a strong supporter of Sulla, and consequently, it had to bear the punishment for being on the losing side. The presence of a colony is evidenced by Cicero as quoted earlier (see footnote 12), but contrary to the case of Volaterrae, here the land actually was settled by the colonists. This led to widespread resistance against the new colonists, and in due course to an uprising against the settled veterans. Licinianus tells that the Faesulans attacked the strongholds (*castelli*) of the colonists, killing many and taking back the confiscated land. In addition, they seem to have sent an envoy to the Roman senate to explain the situation; the envoy then defended the Faesuleans by remarking that they were forced to do this while all their homes had been taken away from them. It seems from the fragmentary evidence offered by Licinianus that this defense was not successful, however: the senate assigned armies to the consuls and set them off to Etruria.¹⁹

An interesting piece of information given by Licinianus is the fact that he presents the Faesuleans as attacking the *castelli* of the colonists. It seems the colonists were not actually living in the town but in fortified strongholds outside. The size and the social composition of these is unknown. Santangelo suggests that they formed a separate community in the same way as has also been suggested for Pompeii. There the old inhabitants continued to live inside the town and the colonists settled on their land in small, fortified settlements.²⁰ However, there is no way of knowing how isolated these *castelli* were, and whether they were composed of one or more *familia*. In the case of Faesulae a large part of the town territory seems to have been confiscated and given to the colonists; whether it was ever taken back is contestable.

It is obvious that this was the instigating factor for the ‘rebellion’ of M. Aemilius Lepidus. When we look at the interpretation of the events connected to Lepidus by Harris²¹, we do see that Lepidus had a strong policy of pre-Sullan restoration, including the reversal of land-assignments and restoration of citizenship to those who had it lost in the Sullan era. What remains unclear is how things suddenly got to the point where Lepidus had an army. The Faesulean rebellion provides a useful explanation for this. It is probable that this revolt happened during Lepidus’s consulship, and one of the consuls sent to Etruria with an army (see above) was just this Lepidus himself. This is an interesting choice since for example the Harris interpretation stresses the long-term character of Lepidus’s policy. One might question the sense of sending a senator with strong, public views in favour of revoking the Sullan land-assignments and a ‘populist’ policy gathering support in exactly those areas where Sullan confiscations had been particularly hard to suppress a revolt that had its origins just in precisely the injustice Lepidus was trying to remedy, and that took place exactly in the area he was hoping to rally in his support. In my opinion, there are two possible solutions for this contradictory action: The revolt did not happen when Lepidus was consul, and therefore it was not Lepidus who got an army in order to suppress that

18 Santangelo 2007, p. 173.

19 Granus Licinianus, 36; see also Santangelo 2007, p. 181.

20 Ibid., p. 181.

21 Harris 1971, pp. 284–285.

revolt; in that case, we still are left with the question where did Lepidus get his troops? Or then Lepidus's policy was not publicly known before this time, which would have allowed him to gain control of an army before starting to promote his own agenda.

But these questions are not important here. The important thing is that Lepidus had wide support in Etruria, as pointed out by Harris from the fact that 'his main military engagement with the government took place in a very forward position . . . in the outskirts of Rome.'²² After the first battle, which ended in Lepidus's defeat, the war continued in Etruria: the decisive battle which drove Lepidus away from the mainland took place somewhere on the Etruscan coast; Harris suggests somewhere close to Cosa.²³

Regarding the somewhat later Catilinian conspiracy, Cicero notes that the Arretine and Faesulean colonists were central in forming the troops of the Catiline army.²⁴ It is obvious that the Sullan colonists were not happy with the way they had been treated, and discontent found its expression once again in a rebellious movement against the government. Santangelo's interpretation of the reasons behind this discontent was the impoverishment of the colonists. The Sullan land colonizations and land assignments had not formed a stable basis for prosperity, and even though the real reasons for the colonists' unfulfilled expectations might well have been the general economic conditions of the time, the frustrations could still be directed towards the government. Santangelo argues also that even though the general economic situation of the state during this period was dire, the reasons for the unsuccessful colonization of Etruria should be found in the local circumstances. The Sullan colonists in Campania were prosperous and there is no sign of them having financial difficulties at all. In Santangelo's interpretation, these 'local circumstances' were related to the mismanagement of the actual colonization process, and the strong opposition of the local population, expressed for example during the uprising at Faesulae and the revolt of Lepidus.²⁵

The colonization process in Etruria seems to have ceased soon. Laurence Keppie, who has done the most recent comprehensive studies on the colonization processes in Italy, finds no evidence of colonization or veteran settlement in the region for the period after 14 BCE at least until the end of the reign of Nerva (96–98 CE), although there is evidence for various settlements in the southern parts of the peninsula, especially Campania.²⁶ Obviously, Etruria was not the focus of any major settlements after the 1st c. BCE.

Local traditions in pottery production

The production of ceramics was a long tradition in the region. In Arretium, the *terra sigillata* production was a natural continuation of earlier black glaze (it. *vernice nera*) pottery, which had started already in the beginning of the 4th century BCE. The well-known production sites for black glaze were at Volaterrae, Arretium and Bolsena, the products of which were of high quality and thus surpassed soon the Campanian production that had originally dominated the markets. In the early stages of the production, during the 4th and 3rd c. BCE, the production was characterized by high quality and local distribution. The items were transported outside their production areas only in exceptional cases, and it is probably safe to say that there was no extensive mid-range trade in ceramics during these centuries.²⁷

22 Ibid., p. 285.

23 Ibid., p. 285.

24 Cic. *Mur.*, 24.

25 Santangelo 2007, 184–187.

26 Keppie 1984, 106–7, *passim*.

27 Guerrini and Mancini 2007; Brecciaroli Taborelli 2005, 63, 68–69.

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In the next phase of the black glaze production, during the 2nd and 1st c. BCE, the production process organizes differently, in large scale production centres. Also, the main production area in this time is Campania, and the Etrurian production sites decrease in importance. During this period, black glaze also becomes a trade item in itself, and acquires an important position in mid-range trade.²⁸ Another notable change concerning the production of black glaze was the disappearance of the stamps on the items. During the first stage of production, the items were often stamped, like later *terra sigillata*, but in this stage, the stamping practice ceased. Pedroni has proposed that this cessation had much to do with the legislation at the end of 3rd c. BCE, more specifically with the *lex Claudia* of 219 BCE. The law forbade senators and their direct offspring from owning for example ships larger than 300 amphoras of capacity, a capacity that was considered enough for the transportation of the products from their own estates. This was part of a series of sumptuary laws, and Pedroni sees the whole development as a process where the land-owning senatorial class tried to limit the entry of ‘new men’ into the higher classes by limiting the forms of property that a senator could have, thus closing the ranks against the merchants and traders that had profited from the recent wars. According to Pedroni, the stamps on black glaze would have disappeared just because they constituted evidence of commercial activity.²⁹

Pedroni, in another article, constructs a detailed argument as to how the *terra sigillata* production might have come about in Arretium as a result of the close connections between political and economic power in the years 61 to 59 BCE. He bases his argumentation on the probable interpretations of the stamps Q.AF and C.SEPT as Q. Afranio and C. Septimio. These names he then connects to known persons of Pompey’s entourage, with origins in the Picenean territory and backgrounds in the Sullan forces.³⁰ The detailed explication of the political scene of the period is convincing although very speculative in nature but its explanatory power is somewhat lacking when we compare the data he has used in his argument to the examples present in the OCK² database. From the 57 different potter stamps in the database with activity period starting from 40 BCE, Pedroni’s theory explains three. In addition, these are not the major producers active at Arretium. Q.AF has altogether 17 exemplars in the database, whereas C.SE (C.SEPT does not exist) has two different stamp types, totalling 10 exemplars. (See table B.1 on page 151.) Until we find similar connections for the S(EX.) PE(), C. SERTORIVS, A. SESTIVS, A. VIBIVS SCROFVLA or L. UMBRICIVS, I would not take Pedroni’s model for certain.

Sangrisono accepts the basic idea the Pedroni’s model of the birth of Arretine production as a result of the settlement of Pompeius’ supporters in the region. He then follows the story further, and explains how the Caesarean settlement (46 BCE) in its turn ended the first phase of production, and how the change in the ruling class of the area resulted in further developments in technology and form. Then, after the Augustan settlements, the period of excellence was reached in 30 to 20 BCE.³¹

There are two features of this Pedroni-Sangrisono model of the birth of *terra sigillata* which are not totally convincing. First of all, both seem to discard the long local tradition in black glaze pottery. Locally produced black glaze existed already in the 3rd century BCE, and the 2nd and 1st century production saw in addition to a modest distribution in the Etruria a major export to Gallia where at the site of Magdalensberg large quantities of pottery made at Arretium have been found.³² Without going into the details of the black glaze pottery, already this level of

28 Brecciaroli Taborelli 2005, 70–73.

29 Pedroni 1988.

30 Pedroni 1995.

31 Sangrisono 1998, pp. 919–920.

32 Brecciaroli Taborelli 2005, p. 72 citing Schindler 1976.

production, and especially exports to Gallia, would point towards a strong local tradition of ceramics production. In this interpretation, the local production does not start from nothing or expand considerably, as suggested by Pedroni and Sangriso, but is a natural continuation of old traditions with the introduction of new technology.

This sense of expansion and new production can be explained by two factors: The type of material changes, so the tradition of studies changes. Different people study black glaze (or *vernice nera*) and *terra sigillata* so different studies end up telling different stories. On the other hand, the change in production to *terra sigillata* coincides with the reappearance of producers' stamps on the items so we suddenly have a change to associate the producers with known, historical figures – something which is not possible between the disappearance of the stamps on black glaze and this reappearance.

So although the *terra sigillata* itself seems to appear suddenly, almost from nothing, I would not rule out that what we see is actually a continuing local tradition changing its form so that our scientific tradition within classical archaeology loses the trace of continuity. To investigate further, we have to look a bit closer at the individual production areas, and the possible local continuities at each place. In fact, within the ceramics studies it is generally recognized that it was the Etrurian, and perhaps even Arretine black glaze which gave birth to the production of *terra sigillata*.³³

Helga di Giuseppe has in her analysis of the differences between northern and southern Etruria from the point of view of black glaze collected the probable production sites of the type in the region. She summarizes other research, and concludes that probable production sites for black glaze were Volaterrae, Lucca, the area of Livorno, Pisa, Clusium and its territory, Arretium, and perhaps also Populonia.³⁴ Also, in the provenance study by Gliozzo and Memmi Turbanti Arretium, Volaterrae and the territory of Clusium are found to be production places whereas Populonia was a source for black glaze only insofar as it was the import harbour for Campanian ceramics.³⁵

In addition to these, the second area of Di Giuseppe's study, the Central Tiber Valley, was an important centre of production, and recent studies at Veii have found remains of at least two centres of production there.³⁶ According to a provenance study by Santrot et al., there was a strong tradition of ceramics production in the region of Bolsena. However, in their material at least, which extends well into the era of the Julio-Claudian emperors, there is no sign of local *terra sigillata* production. The production is limited to black glaze and thin walled ceramics, and for some reason, local producers never make the switch into *terra sigillata*. The extent of local production is not negligible, however, as the study shows that from the analysed material, only 12.3 % was not of local origin.³⁷

Thus it seems that the production centres of *terra sigillata* all had long traditions in the black glaze production – a fact which is also admitted by Pedroni when he notes that some of the forms familiar from late black glaze are also well attested in the early *terra sigillata* of the same region.³⁸ This was also the basis of Christian Goudineau's model of the birth of *terra sigillata*. He saw it as a result of local development and experimentation, as the long time it took to master the technique and achieve the technical level of the 30 to 20 BCE was not consistent with a theory of expert potters brought in from elsewhere.³⁹

33 Brecciaroli Taborelli 2005, p. 71

34 Di Giuseppe 2005, p. 37.

35 Gliozzo and Memmi Turbanti 2004.

36 Di Giuseppe 2005, pp. 42–43.

37 Santrot et al. 1992.

38 Pedroni 1995, p. 196.

39 *ibid.*, p. 196 citing Goudineau 1968, pp. 317–347.

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So even though Pedroni and Sangriso do not deny the local traditions in black glaze, I still find their critique of the Goudineau model untenable. To me it seems that they are overtly fond of ‘politics’ as the *primus motor* of human action – and were the ceramics production exclusively upper class activity, I would concur with their critique, and accept the political context as decisive factor in the birth of a new form of production. However, in the case of *terra sigillata* production, Pedroni’s argument, which is already presented earlier, does not convincingly show that the men behind the production were of the propertied, politically influential class of the society.

In addition, if we consider the geography of the new production, one would expect that the colonist-instigated move to *terra sigillata* would happen in the places, where land was confiscated and assigned – in the case of Arretium, which is a central place in this discussion, this does not hold. Even though land was confiscated in large amounts, it probably was left unassigned, as shown earlier, and therefore, mostly left in the precarious care of their previous owners.

Pottery production as a survival strategy?

In fact, one could interpret the emphasis given to ceramics production as a kind of survival strategy in the unstable political environment of the times. In the event of one’s land being appropriated, one might start to think, how to ensure one’s livelihood also in the future. In the event one is left in the temporary control of the lands with the expectation that they will be taken as soon as the time is right, one may not want to invest energy in the kind of production that is too closely attached to a certain piece of land. Every kind of agriculture suddenly becomes less appealing as the results of hard work could be taken away at any point, for example just as the harvest is ready to be collected; also, most types of agriculture are long-term activities, and good results come from land that is well taken care of – a fact well known, if we look at the agricultural guides.⁴⁰

On the other hand, manufacture, such as pottery production, is not so much tied to land occupied. In this type of production, the main investment is to the skilled workforce. In the event that the physical resources – ovens, clay, wood – are finally assigned to some colonist, it is still possible to keep the most important asset, the expertise of the pot ceramicists, and start again with some other physical resources.

In studies of pottery production much attention is often paid to the actual physical resources of the production. Of course, it is necessary to have good-quality clay, but that is not rare; of course, wood, or some other fuel, is needed for the ovens; of course, you need the ovens; but still, the most important capital a pottery producer could have is the skilled work force. The market value of the pots is tied to their quality. With market full of good-quality products, and with long traditions of pottery trade there is no room for mediocre quality products in the large-scale commerce – a less-than-optimal quality product might see a minor local diffusion but would hardly be distributed farther. The situation is very different from products like bricks and tiles or the so-called kitchen ware pottery where the required level of skill to achieve a passable end-product is not as high.

This model actually makes the abstract capital of the work force the main source of wealth. A landowner in this case would be the one to entice the potters by offering lucrative deals. It also has good explanatory power especially in the context of the socio-political developments outlined above: It is capable of explaining both the continuity and discontinuity of tradition.

40 Like Cato, *Agr.*, 3, where it is advised that a young man should concentrate first on planting on the farm and start building only when he is older. In the same place, Cato’s advice on the long-term relation between the land and the buildings on it clearly points to a long-term investment spanning decades.

In the case of Arretium, we have a continuing, strong tradition of pottery production and export. The quantities of Arretium-originating pottery found at Magdalensberg indicate that even this was no locally limited phenomenon but already production aimed for bigger markets. What happened here during these post-Sullan times could have been a conscious intensification of production with the explicit aim of producing as commercially lucrative material as possible. This would easily be explained by the precarious situation after the Sullan confiscations which left the land-owners with their resources but without any reason to believe that the resources would be there in the future. In this case, pottery production would be a natural choice as it would allow for the amassing of new, monetary capital which in turn would allow for a relocation to a new area. This intensification would bring with it the need for improving the products as they would have to be as desirable as possible in the eyes of the potential buyers; one could imagine that the eye of a producer would turn to what were the most desirable ceramic objects of the day. This would also explain why the already proficient makers of black glaze would still require a long period of experimentation before bringing the new, red alternative to its highest quality.

In the case of Arretium, then, what we see in the production of *terra sigillata* is a result of the colonizations only incidentally. The land confiscations turned the land-owners to intensifying the forms of production not so closely tied with the land, and therefore the effect of the colonizations and confiscations would not be in the colonists who would have started the new production but in the locals who tried to adapt their own activities to the new, threatening context forced upon them. Prachner, who studied the nomenclature of the *terra sigillata* stamps especially from Arretium, points out that in the early stages of the production, names of slaves or freedmen do not appear on the stamps. In fact, the production, according to Prachner, is a direct continuation of the earlier Black Glaze production in the region.⁴¹ Later on, the slave names appeared on the stamps but there is evidence that even in these cases, the situation is not quite so straightforward: For example the case of STABILIO who appears on both stamp 507 and 752 in OCK². There can be no doubt about the close relation between these two stamps as examples of them were found at the same production dump in Arretium, the location *le Carciarelle*, in 1492.⁴² In addition, the layout of the stamps 507.2 and 752 is very similar, both having text STABILIO on the upper part, and a shortened version of the master's *gentilicium* in the lower part. Here we most certainly have evidence of a 'contractual' operation where the slave worked for two different masters. To whom the slave actually belonged is a different matter.⁴³

An interesting possibility a 'gentleman' had when trying to operate in business is *peculium*. This word meant the piece of property given to a slave by his master for independent operation.⁴⁴ Zwolve's analysis of the functioning of *peculium* as an instrument for investing money opens new possibilities of interpretation. As Zwolve shows, the *peculium* was in many ways like our modern day companies. Opposed to our common sense view, where the slave was given a *peculium* to work with, Zwolve sees the *peculium* itself as a quasi-person, and the slave is just operating on behalf of the *peculium*. The responsibilities of the owner of the *peculium* were limited to the amount of the *peculium*, and neither could the slave be held responsible for anything else than the amount given to him as *peculium*. Also, the *peculium* could be given by a group of individuals, and thus, the slave was owned in common, too. This practice solved the problem that a slave is not legally capable of representing himself: While acting on behalf of the *peculium*, the slave could act as if he were legally capable because it was the *peculium* which was held responsible for

41 Prachner 1980, pp. 213–214.

42 OCK², 26.

43 Fülle 1997, esp. 144–145.

44 Actually, also the piece of property given to a son to manage.

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the agreements.⁴⁵

Zwalve's view of the *peculium* actually strengthens the position of the persons-called-slaves in the production, and could well explain the appearance of one slave name connected with two different *gens* at the same site. Also, in the beginning of this chapter, the case of the slave Felix was brought up. In that case, the stamp bore the slave's name in nominative; in the case above, the name of Stabilio ends in a way that could point to the use of genitive case. Whether this is really supportive of Zwalve's model of *peculium*-as-investment is beyond the scope of this chapter but the conclusions are very similar to what Fülle has made.⁴⁶ The slave/freedman/*officinator* and Fülle's nucleated workshops are a natural solution to an investment in *terra sigillata* industry by a small- or medium-scale land-owner in the regions where the socio-political situation was as it was in Arretium.

By comparison, the situation in the region of Bolsena where black glaze of some quality has already been produced in quantities is free of the threat of land appropriation. There are no signs of any threat to the landed properties of the local elites, and therefore no incentive to intensify or diversify one's means of survival. It seems that here the black glaze suffered the fate of a good-quality, non-inventive local product which survived in the local commerce for a long time before dwindling out in the end.

Volaterrae was a traditional black glaze production area, too, where land was confiscated in large amounts, but never completely assigned. Obviously, Volaterra is a very special case. Nicola Terranato's work on the romanization of Volaterra has pointed out important and interesting features of the local culture, especially its strong continuity from the Etruscan to the Roman period. This is very different from results obtained in elsewhere, like in the *ager Cosanus* area⁴⁷, or in the South Etruria Survey⁴⁸. Terrenato is convinced that Volaterra is an example of strong continuity of the socio-economic formation of the countryside from the Etruscan times to the medieval period. The settlement patterns do not change markedly, or the change is very gradual, and the excavations at S. Mario do not show any changes in its architectural or functional form. However, the richness of the find material found at the site suggests that the stability of form was not because lack of means but tells something deeper about the local culture. The 'shining beacon' of the local conservatism and traditionalism, in Terrenato's reconstruction, seems to be the *gens Caecina*, perhaps the most important Volaterran family, and a member of which we met above in connection with Cicero's court case. It was active already in the Etruscan expansion to the east and north of the Apennines⁴⁹, and keeps appearing in the sources all the way up to the fifth century CE.⁵⁰

On the other hand, there is no denying that the city did suffer in the Sullan sack; and that there was a colonization of the town during Caesar's time. The confiscated lands were to be assigned in 63 BCE, according to the proposal of the tribunes which Cicero managed to ward off; this whole pattern was repeated in 60 BCE. The situation was settled finally with the Caesarean colonizations in 45 BCE when Cicero pleaded to the man responsible for the colonization processes, Q. Valerius Orca, to spare Volaterrae. In the two surviving letters, Cicero stresses the long duration and continuity of the land holding practices of the Volaterrans – the land was as it had been for centuries, and thus, in light of this long tradition, the Volaterrans should not be removed from

45 Zwalve 2002.

46 Fülle 1997, pp. 144–6.

47 Dyson 1978; Attolini 1982; Attolini 1983

48 Basic work is Potter 1979, but recent work by British School of Rome is broadening our views, see for example Witcher 2006 and Di Giuseppe 2005 and Patterson, Di Gennaro and Di Giuseppe 2000

49 NP.

50 Terrenato 1998, pp. 107–108.

their lands ‘preserved to them by immortal gods’.⁵¹ That this plea was at least partially successful can be seen in the results of the survey presented by Terrenato. There is no sign of extensive changes in the land holding patterns in the studied parts of the Volaterran territory but the visible marks of a colony in the town and the gradual shift from Etruscan to Latin as the main public language do show that the locals – the Caecinae? – had realized that it was better to play by the Romans’ rules.

The response to the threats offered by the new, political situation were clearly different in Volaterrae from what they were at Arretium. Based on what we know of these two towns, there seems to have been a big difference in their social composition. It seems safe to assume that the Caecinae were the important people in Volaterrae especially after the Sullan sack who ‘took care’ of the town and its population. There is no sign of the local elites continuing their traditional role as supporters of the whole community Arretium. This difference might well explain why there was a strong emphasis on the production in Arretium but hardly anything similar at Volaterrae.

Clusium (mod. *Chiusi*) has a long tradition in Black Glaze production and exports.⁵² In the Sullan wars, Clusium saw some heavy fighting, and it seems to have been the site of Carbo’s headquarters for a while, thus liable for punishment after the wars. The evidence of a Sullan colony rests on the evidence of Pliny’s town list where the colonies are called ‘Clusini Veteres, Clusini novi’⁵³, and there is no reason to doubt the existence of a double community at the site. Harris also notes that there is evidence of large-scale dislocation among the inhabitants, and that the cemeteries used for centuries fall out of use after the beginning the 1st century (BCE), probably because of the destruction of the local population in the Sullan war.⁵⁴ Consequently, Clusium does not appear among the production sites of *terra sigillata*, and the long tradition of black glaze production and export seems to have died out.

It seems that the reasons for the beginning of the *terra sigillata* production were social and political, but in a different way from what Pedroni and Sangriso, for example, have claimed. The short survey of some of the major production areas, and some of the major non-producing areas, supports the claim that the origins of the production lie not in the activities of the new, immigrating colonists or their dependants but in the local tradition of pottery production which suddenly acquired a new importance in those places where the old population was on the brink of losing their properties.

51 Cic. *Fam.*, 13.4 ; Terrenato 1998, pp. 106–107.

52 For example, Gliozzo and Memmi Turbanti 2004 study the production and distribution patterns of Black Glaze pottery, and Clusium appears an important region of production and export as well as consumption.

53 Plin. *HN*, III, 52.

54 Harris 1971, pp. 256–257, 263.

3

Routes of trade and transport

Transport and cost

This chapter tries to formulate some kind of understanding of the practices behind the *terra sigillata* trade by beginning with an issue that has been much debated in the literature – transport costs. The reason for this is simple: the two sides of the discussion rarely meet. The analysis of possible and potential transport costs is usually based on hypothetical models defining transport and its relation to a geography, thus subjecting the actors to a logic that is inherently modern in its emphasis on the economic rationality of profit maximization. Critics of this start basically by challenging this assumption of profit maximization but are rarely able to advance beyond this to the kind of argumentation that would work against the ‘profit maximizationists’. These, in turn, are rarely able to express their arguments in any of the concepts that would be acceptable to the critical ‘culturalists’.¹

This chapter tries in one way to fill the gap between these two sides of the battle, and it seeks to do so by studying the actual remains of logistic and commercial practices, the distribution of *terra sigillata* pottery. The assumption is that if the cultural critique has any grounds, the transport costs that can be derived from these distributions will not simply follow the logic of profit maximization. A simple test case would be to show that items produced in one place were found close to another place where similar items were produced. In this case, the logic would then have to be something other than minimizing the transport costs. But on the other hand, there are multiple explanations for an occurrence of single items in one place, and to base any kind of argument on a single occurrence of an item would be to accuse the ‘profit maximizationists’ of stupidity – when emphasizing the importance of transport costs, and their decisive position in defining flows of commerce, they do not insist that everyone always blindly followed these rules. The argument lies on a more general level: *in general*, the transport costs were so decisive that *statistically* they defined the flows of commerce. This does not of course rule out such features as people giving gifts or moving to another place – both practices which might move things around without any relation to transport costs.

My argument in this section will then have to be more general, and perhaps even more quantitative. The material at my disposal in the form of the OCK² database provides a good basis for this kind of an approach. In keeping the work close to the actual problems of transport costs, instead of presenting the problem in the form ‘What other factors might define the distribution patterns of *terra sigillata* items than transport costs?’, I will in this chapter still concentrate on the question ‘How did transport costs actually affect the distribution patterns of *terra sigillata* items?’

1 One could actually see here a reformulation of the old division between ‘substantivists’ and ‘modernists’.

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To answer this question, I will perform a transport cost analysis of the *terra sigillata* pottery in the OCK² database while at the same time limiting the analysis to items produced and found within the area of the Roman Etruria; this is done in order to understand the transport practices within this region. This analysis is performed two times, first based solely on the terrain forms of the region, the second time by also taking into account the possible different transport methods. Of these analyses, the first one reflects the situation where everything is supposed to move by land using the supposedly dense network of roads in the region, and the second analysis allows for the possibility that the traded pottery might have been transported also by waterways, the rivers in the region and the sea bounding the region to the west.

The central tactic of this chapter is in this twofold analysis where the differences between the two potential models can be compared. In the end, it is perhaps possible to venture out to say something about the typical form of transport used by the *terra sigillata* traders.

It is common to assume that in pre-industrial times land-transport was so ineffective that any large scale transport would have to be done using different waterways: the sea, rivers and channels. This assumption is not wholly anachronistic as it is also present in the ancient literature: the Roman gentleman, whose career still in the period of this study often included some very practical stages, was very aware of the fact that whereas a boat moves almost by itself on water, a cart or carriage needs constant work to advance. An example of this awareness is presented by the letter the Younger Pliny sent to emperor Trajan during his propraetorship in Bithynia in 103 CE in which he recommends the building of a canal to further the commerce and traffic². Almost two hundred years later, the costs of transport dictated by Diocletian's Edict on Maximum Prices of 301 CE demonstrate a similar awareness.³

This has often led to the very simplistic assumption that everything must therefore be transported by water as every economic calculation will immediately show that the costs of transport rise steeply as a function of distance when travelling on land. This makes it impossible to transport by land anything that is supposed to have market value unless it is of extreme rarity and/or value.⁴ In Neville Morley's study on the relations of Rome with its 'hinterland' that covers partially the same area as this study, this assumption is generally adopted. Based on suggested travel costs for different forms of transport (see discussion from page 64 onwards for these costs), he creates a simple cost isoline map showing various levels of travel costs to Rome.⁵ The map is illuminating but to take it at face value – which Morley himself never does – is to assume that the choice of transport method depended *only* on the cost incurred by the actual movement with the selected method. However, to support the primacy of river transport, Morley cites for example Strabo who refers to the rivers as important means of supply for both food and construction material, along with the forests and pits (supposedly so close to Rome that the transport was not a separate issue, and probably happened by land).⁶ In his emphasis on the river transport, Morley misses what Strabo writes about the roads later on: the Romans built paved roads in the land through hills and over gorges so that the wagons could carry boatloads.⁷ It is evident that at least Strabo

2 Plin. *ep.*, 10.41.

3 A number of copies of the edict have been found, the Aphrodisian being one of the most complete: Erim and Reynolds 1973; Erim, Reynolds and Crawford 1971; Erim et al. 1970.

4 A classic exposition of this view is Yeo 1946; but for a summary of critical works, see for example Harris 2007, 535, n. 140. A classic example of an item with the necessary rarity and value was silk that was imported from China.

5 Morley 1996, Map 1, p. 64.

6 πρὸς ταῦτ' οὖν τό τε τῶν μετὰλλων πλῆθος καὶ ἡ ὕλη καὶ οἱ κατακοιμίζοντες ποταμοὶ θαυμαστὴν παρέχουσι τὴν ὑποχορηγίαν, πρῶτος μὲν Ἄνιων ἐξ Ἄλβας βέων τῆς πρὸς Μάρσιος Λατίνης πόλεως καὶ διὰ τοῦ ὑπ' αὐτῇ πεδίου μέχρι τῆς πρὸς τὸν Τίβερι συμβλήης, ἔπειθ' ὁ Νάρ καὶ ὁ Τενέας οἱ διὰ τῆς Ὀμβρικῆς εἰς τὸν αὐτὸν καταφερόμενοι ποταμοὶ τὸν Τίβεριν, διὰ δὲ Τυρρηνίας καὶ τῆς Κλουσίνης ὁ Κλάνις. Strabo, 5.3.7

7 ἔστρωσαν δὲ καὶ τὰς κατὰ τὴν χώραν ὁδοὺς προσθέντες ἔκκοπὰς τε λόφων καὶ ἐγχώσεις κοιλάδων, ὥστε τὰς ἀρμαμάζας δέχεσθαι πορθμείων φορτία. Strabo, 5.3.8

did not consider the rivers as the only important means of transport in the supply of Rome.

And Strabo is not alone in stressing the importance of the roads. Also Columella advised the aspiring land owner to note that a good road nearby raises the value of the land – and also utility. This was for many reasons, among which the ease of travel for the owner, ease of transport of incoming and outgoing necessities and products, and the lesser cost for hired draught animals.⁸

The assumption that river transport was always used because of its low costs can be challenged also from a very practical point of view as for example Ray Laurence has done. He is critical of this view because of its complete lack of interest in the differences of scale and the motives of the actors behind the transport. While for bulk material – like grain, oil and wine – the only sensible choice of transport might be by water, the same might not hold for less bulky items in smaller quantities. This is especially true when the distances were short, and the markets close by. His analysis of the possible marketing practices for the villa of Settefinestre near Cosa on the Etrurian coastal plain is suggestive in its practical nature. The products were often sold to urban centres of which there are at least six within a 40 km radius, and three within a 20 km radius, in addition to Cosa itself with its harbour facilities which was just a few kilometres away. The small towns relatively close by and the harbour of Cosa provided ample options for marketing the produce from the villa: large scale export through the harbour, small-scale commerce with the neighbouring towns, and the labour force for both provided by the villa's own slave population. In addition, one of the main roads of the Empire, via Aurelia, passed just a kilometre away from the villa providing additional marketing options.⁹

The model presented by Laurence regarding the villa of Settefinestre is purely speculative, and can be criticized for its lack of any empirical basis. The main point of the model, however, merits a further look. Laurence is not trying to demonstrate that land transport was more important than sea or river transport nor is he trying to demonstrate that land transport was cheaper; his point is just to show that we cannot explain everything with sea transport as even the grain imported from Egypt to Rome had other transport costs incurred on it before it was ever loaded to the ships.¹⁰

In a perfect world, with all the navigable rivers one could wish for and all the fertile plains along these rivers one could dream of, all production probably would be located along these rivers; the Roman world was no such place, though. Large parts of the Mediterranean are characterized by relatively narrow coastal plains, and the typical rivers have plenty, even too much, water during the rainy season, and often almost dry out in the summer, being navigable only for a part of the year. The population was relatively large, and fertile land and other natural resources were often located in places with not very good natural water-ways. People had been living in the land already well before the Romans conquered the areas, and if we believe the general image of these prehistoric societies, trade and commerce were not the principal form of livelihood. Thus, the 'Taxes and Trade' -model of Keith Hopkins¹¹, which still is a credible basis for understanding the monetization of the Roman world, would create a need of money for people who perhaps were living in areas which were not the best for money making, in the sense implied by profitability-based economic theories; areas where agriculture and even production might still be carried out to such an extent that enough marketable surplus was created, and the

8 Columella, *Rust.*, pp. 1.3.3–4: *Multum conferre agris iter commodum: primum, quod est maximum, ipsam praesentiam domini, qui libentius commeaturus sit, si vexationem viae non reformidet; deinde ab invehenda et exportanda utensilia, quae res frugibus conditis auget pretium et minuit impensas rerum invehendarum, quia minoris adportentur eo, quo facili nisu perveniatur; nec non nihil esse etiam parvo vehi, si conductis iumentis ite facias, quod magis expedit quam tueri propria; servos quoque, qui secuturi pater familiae sint, non aegre iter pedibus ingredi.*

9 Laurence 1999, 104–5.

10 *Ibid.*, p. 98.

11 Hopkins 1980; Hopkins 1995/96.

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money for taxes secured. Hopkins summarizes his own model so well that it is worth the while to quote his own words on the matter:

Some of the richest provinces of the Empire (Spain, Syria, Greece, southern Gaul, Aria Minor) paid taxes in money, most of which were exported and spent, either in Italy or in the frontier provinces where the armies were stationed. The rich core provinces then had to get their tax-money back, by selling food or goods to the tax-importing regions. . . . Thus the prime stimulus to long-distance trade in the Roman Empire was the tax demands of the central government and the distance between where most producers (taxpayers) worked and where most of the government's dependants (soldiers and officials) were stationed.¹²

In certain cases long-distance land transport was also the natural choice, more profitable and better for the goods transported. This is the case of Cisalpine pork that most probably came to Rome on the hoof.¹³ But in some cases, as with the Gallic hams and shoulders reported by Varro, the meat was certainly brought already seasoned to Rome.¹⁴

Similarly incredible is the claim that the geese came by foot from the land of the Morini, a Belgic tribe living on the coast of the English Channel, all the way to Rome.¹⁵ The pigs were walking around Italy in 150 BCE¹⁶ and the geese evidently were still walking from Belgica around 50 CE¹⁷, so it seems that at least in this respect, nothing had changed during these two hundred years: as it must have been profitable to walk the pigs around Italy in 150 BCE, it must still have been profitable to walk the geese through Gallia in 50 CE. When it comes to the large scale production of wine, wool etc. that Strabo describes in the Po Valley, he actually never claims that any of this was transported outside the region – this practice is reserved solely for the pork.

On the other hand, Cato the Elder has written in his treatment on the management of a landed property (*de agricultura*) much about procuring the necessary utensils and tools for the farm. A well-known and often discussed piece of text is his comparison of the costs of buying a mill from the nearby Suessano and the more remote Pompeii.¹⁸ In Cato's calculations, the cost of the mill at Suessano and the expenses of its transport to his farm would total to 629 sesterces. In comparison, the cost of the mill at Pompeii and its transport would total to 724 sesterces. It would be easy to interpret this as evidence for the costs of land transport, and also, to see in Cato's writing a warning not to use land for transport.

Laurence aims his criticism especially towards this classical interpretation of this passage¹⁹,

12 Hopkins 1978, p. 46.

13 Harris 2007, p. 535; Yeo 1946, p. 226; Polyb., 2.15.3: πλείστων γὰρ οὐκῶν ἱερῶν κοπτομένων ἐν Ἰταλίᾳ διὰ τε τὰς εἰς τοὺς ἰδίους βίους καὶ τὰς εἰς τὰ στρατόπεδα παραθέσεις, τὴν ὀλοσχερεστάτην χορηγίαν ἐκ τούτων συμβαίνει τῶν πεδίων αὐτοῖς ὑπάρχειν. Also Strabo, in the beginning of the 1st century CE, writes: καὶ γὰρ ἡ γεωργουμένη γῆ πολλοὺς καὶ παντοίους ἐκφέρει καρποὺς καὶ αἱ ὕλαι τοσαύτην ἔχουσι βάλανον ὥστ' ἐκ τῶν ἐντεῦθεν ὑοφορβίων ἡ Ῥώμη τρέφεται τὸ πλεόν. (Strabo, 5.1.12), but it must be noted that Strabo actually writes about the butcheries, not the pigs themselves. Whatever the means of transport, pork evidently came a long way to Rome.

14 Varro, *Rust.*, 2.4.10: *Optimarum signum, quot etiam nunc quotannis e Gallia adportantur Romam pernae Comacinae et Cavae et petasiones*. The emphasis is on the high quality of the Gallic cured pork, which is indicated by their markets in Rome.

15 Plin. *HN*, 10.28: *mirum in hac alite [anser] a Morinis usque Romam pedibus venire*. cf. Yeo 1946, p. 226.

16 Polybius died in 118 BCE and his *Histories* – the source quoted for this information – described events until 146 BCE.

17 Pliny the Elder, the source for this information, died in the eruption of Vesuvius that buried Pompeii and Herculaneum in 79 CE.

18 *Trapetus emptus in Suessano HS CCCC et olei P.L. Conposturae HS LX; vecturam boum, operas VI, homines VI cum bubulcis HS LXXII; cupam ornatam HS LXXI, pro oleo HS XXV; S. S: HS DCXXVIII. Pompeis emptus ornatus HS CCCXXCIII; vecturam HS CCXXC; domi melius concinnatur et accommodatur, eo sumpti opus est HS LX: S. S. HS DCCXXIII. Cato, Agr., 22.3*

19 Starting with Yeo 1946.

but indirectly, it is directed against all the later research that fails to pay attention to what the authors of the classical texts were really trying to say. In Laurence's analysis, the point of Cato in this passage is *not* to emphasize how much more expensive it is to buy the mill stones from Pompeii 75 miles away instead of the closer Suessano which was only 25 miles away from Cato's farms. In his calculations for the price of the mill stones from these two sources, Cato comes to the conclusion that the mill-stones from Pompeii cost ca. 15 % more than the ones from Suessano when transport costs were included. This far, all is good, but Laurence notes that from the total costs of the mill stones from Pompeii, the transport costs form over one fourth of the price. Laurence's point is that instead of concentrating on the costs of *transport*, we should pay more attention to the cost of the *merchandise*. There was a marked difference in the price of mills between Suessano and Pompeii, and even though in Cato's case it was still cheaper to buy the mill from Pompeii, Laurence emphasizes that in general, Cato wants to show the reader that it might be profitable to buy from a more distant place even with the transport costs included.²⁰ So in fact Laurence's reading of Cato would make him mean that it was not obviously cheaper to buy one's necessities from the closer source but that one always has to take the price of the particular items in account and only after that consider the price of the transport necessary.

The validity of Laurence's critique is far from absolute as it is based on a different interpretation of Cato's text, but even in this case it is not something to be completely discarded as what the authors intended with their writing can be hard to decipher. An example of a situation where the location of an activity is not an obvious result of the transport geography is the major *terra sigillata* production site of *La Graufesenque* in Southern Gaul. It has been argued that the finished products were not taken first to the nearby river of Tarn – which in fact is not navigable at this height – but transported overland to Narbo by a route that is at least 80 km long.²¹ The same thing goes for east Gaulish *terra sigillata* products for which land transport was an important means of distribution.²² It seems that the sites of production for these highly competitive and widely traded items were not chosen principally with the ease of transport in mind, and land transport cannot have been prohibitively expensive as the markets of *terra sigillata* in Gallia were highly competitive, and these were the dominant production sites of those markets. Other factors than transport costs were decisive in the selection of production location too, and in the case of *terra sigillata* – or pottery in general –, the quality of clay and availability of fuel for the ovens are the two factors that immediately come to mind.

In fact, in his description of Gallia, Strabo describes a kind of mixed mode transport that was to him the logical choice. The river network in Gallia was extensive and most of the major rivers were navigable for long stretches. Between the different river networks, the freight had to be taken overland but, according to Strabo, this certainly was no problem. This practice extended also to the valley of Rhone as the river itself was not easily navigable upstream due to the rapidity of its flow, and therefore, the items travelling the valley upwards were often taken by land in wagons as it was easier to do so.²³ The same kind of model is present in Jane DeLaine's analysis of the construction processes of some of the major buildings in Roma and Ostia. The availability of construction materials was limited by the geological and topographical features of the areas surrounding Rome, and the useable building materials often just were not located by any navigable stream. Based on the position of some known extraction sites of materials used and comparative evidence from later periods she has been able to calculate that, for example, if all the *pozzolana* used in the construction of the Baths of Caracalla was brought from the quarries near

20 Laurence 1998, p. 96.

21 Middleton 1980.

22 Harris 2000, p. 716.

23 4.1.14 Strabo.

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San Paolo²⁴, it would have needed one cart with a load of half a tonne departing from the quarries every minute, 12 hours a day, 300 days a year, for four years. One can imagine the amount of traffic on the roads created by this constant flow of construction materials – and in fact, DeLaine points to the photographs taken during the construction boom of the *risorgimento* showing lines of carts exactly as described here, moving to the selce quarries on the Via Appia.²⁵

Over the hills and far away

To analyse how resistant the trade in *terra sigillata* was against the costs incurred by transport, I will in this section perform an analysis of transport costs. To assess the costs incurred by the partially difficult landscape of the region, I create at first so-called accumulated cost maps reflecting the effect of the land forms on transport. As a basis for the analysis, I have used the SRTM data collected by the Space Shuttle Endeavour. This 11-day mission in 2000 had as its objective to create a digital topographic database of large parts of the globe. The radar was mounted on the space shuttle, and the resulting data has been post-processed and cleaned before being released for public use by NASA.²⁶

Based on these radar measurements, I created a Digital Elevation Model (DEM) with the GRASS GIS. This is the geographical basis used for all the maps in this study. The DEM basically is a topographical model of the surface of the earth. It is in the format of raster images where each cell (pixel) has a value reflecting the average height of the terrain from sea level on the area covered by the cell. The data used in this chapter covers the area between the latitudes 44°10 and 41°40 north and longitudes 10° and 12°40 east. The resolution of the data is 3 arcseconds, resulting in a raster map of 3,000 rows with 3,200 columns, totalling 9,600,000 cells.

From this elevation model, I created cumulative cost maps using the GRASS module `r.walk`, which computes a cumulative cost map as a linear combination of the altitude and the distance covered using the DEM. The algorithm that the module uses is based on the assumption that whereas a moderate downhill speeds up the progress and a moderate uphill is a slight hindrance, a steep downhill makes progress difficult, as does a steep uphill, too. To reflect this effect, the up- and downhills of over 12° are given a strong cost-increasing factor, which quickly leads to prohibitively large expenses when using these routes.²⁷ In this first analysis, the data fed to the algorithm is pure height data from the DEM with the only exception that sea is masked out. This means that whatever rivers there are have no effect, crossing of the sea is not possible and the road network has not effect at all; I'll return to these in the next section.

To reflect the two main production locations in Etruria, two cost accumulation maps were produced. Figure fig. 3.1 on the next page shows the accumulated cost when travelling by land from Pisa to different locations in Etruria; the colours used on the map have only a relative significance. At this point, I would not speculate, whether for example the second-darkest areas were 'prohibitively expensive' to travel to from the point of view of transport costs, or whether it would be 'profitable' to transport items or raw materials only within the white area, for example. The colour variation has meaning only within one map where they are used to show the relative increase of travel costs.

What is interesting to note, and in itself not too surprising, is the fact that the lowest cost routes drawn on the map follow very closely the river valleys. Travel is cheap on the valley floors,

24 Near the modern-day church San Paolo fuori le mura.

25 DeLaine 1995.

26 <http://www2.jpl.nasa.gov/srtm/> (Data loaded November 21th 2006)

27 See the program documentation for a detailed description and sources of the algorithm: <http://grass.osgeo.org/grass62/manuals/r.walk.html>

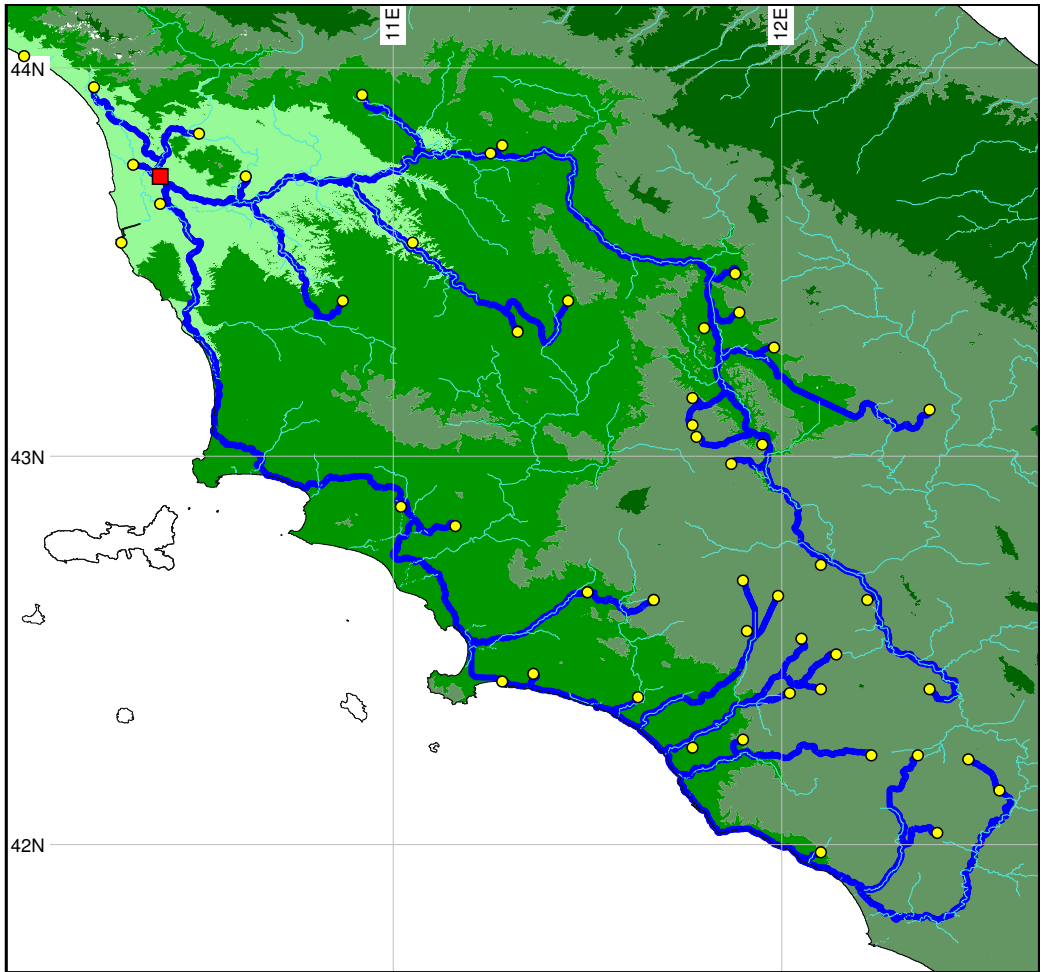


Figure 3.1: The accumulated travel costs from Pisa. Pisa is reflected as filled rectangle, and the circles reflect the findspots for *terra sigillata* in Etruria. The thin lines are the main watercourses in the area, and a thick line connects each location with Pisa using the less costly route possible. The different darkness of the terrain reflects the cost on the accumulated cost map – the darker areas are more expensive to reach from Pisa.

especially since this model does not take into account types of vegetation nor existing roads. The travel routes are bound to follow the low areas, and as Pisa is both on the coast and at the mouth of the Arno river, it is no surprise that the easiest routes to travel follow the coast and the river.

In comparison, a similar map for Arretium is shown by figure fig. 3.2 on the following page; the colour schemes for the maps are the same. This map shows somewhat different results. Almost all of the known find locations are in the second zone, shown by the light grey color. In addition, when we compare the lowest cost routes from Arretium to the various find locations, we see three different main options, as compared to the two for Pisa. In the case of Pisa, the two main options were either to follow the coast or to take the route along the river valleys of Arno, Chiana and Tiber. Now, in the case of Arretium, two of the routes still follow these river valleys,

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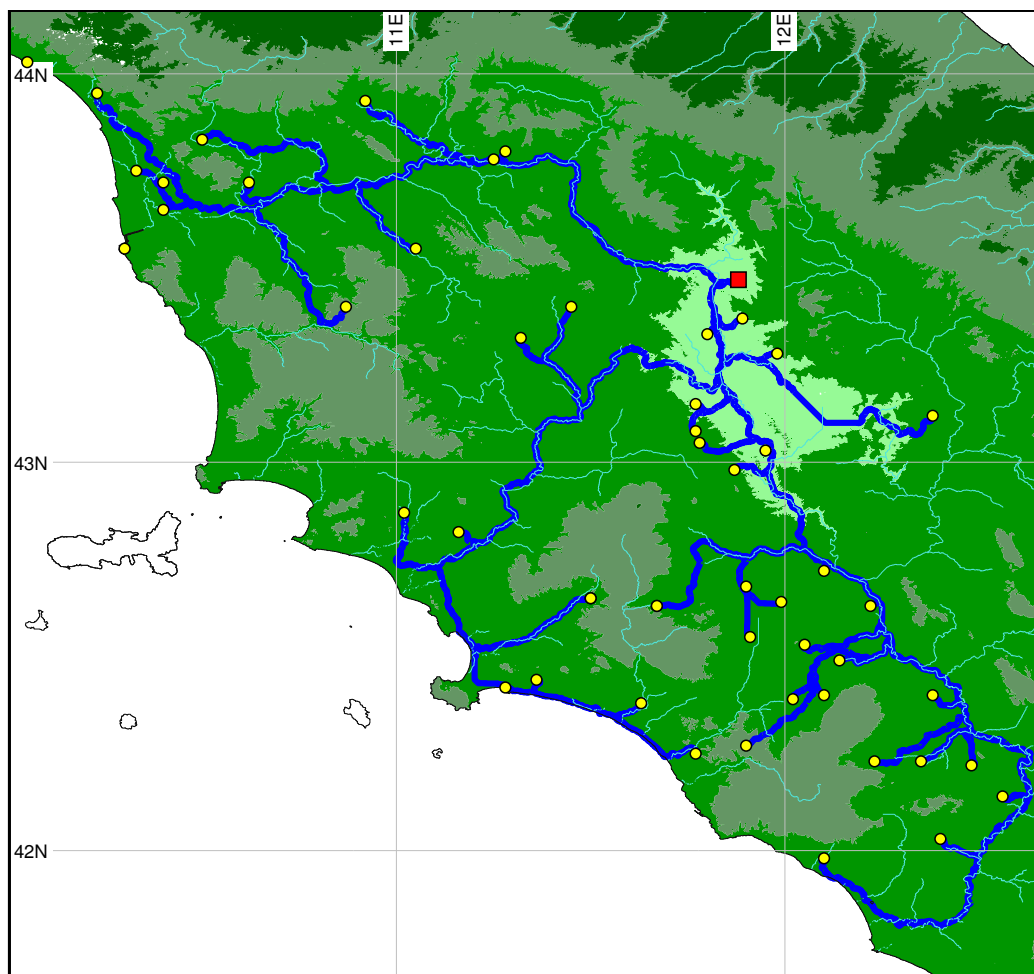


Figure 3.2: The accumulated travel costs from Arretium. For map description, see the respective map on Pisa. (fig. 3.1 on the preceding page)

but in addition to these, the third route goes to the coast along the valley of the river Ombrone, and then follows the coast. Generally, Etruria is easier – and cheaper – to cover starting from Arretium than it is from Pisa.

It is also possible to combine these two maps together, to form a composition of the travel costs relative to Arretium and Pisa. Consequently, this map (see figure fig. 3.3 on the next page) has two centres, i.e. zero-points for the accumulated travel costs, Pisa and Arretium, which are both marked with boxes. The increasing levels of grayness reflect the accumulated travel costs to the zero-location easier to reach, and the thick dark lines show the routes from each of the locations on the map to the zero-location easier to reach. In practice, this map shows a division of Etruria in two ‘market zones’ according to travel costs by land. Consequently, if we assume that the production costs at each of the two sites were equal, the work force was equally skilled and the products were similar in every way, this map shows from which production site did the items with lower transport costs come if the level of the cost was only dependant on the terrain

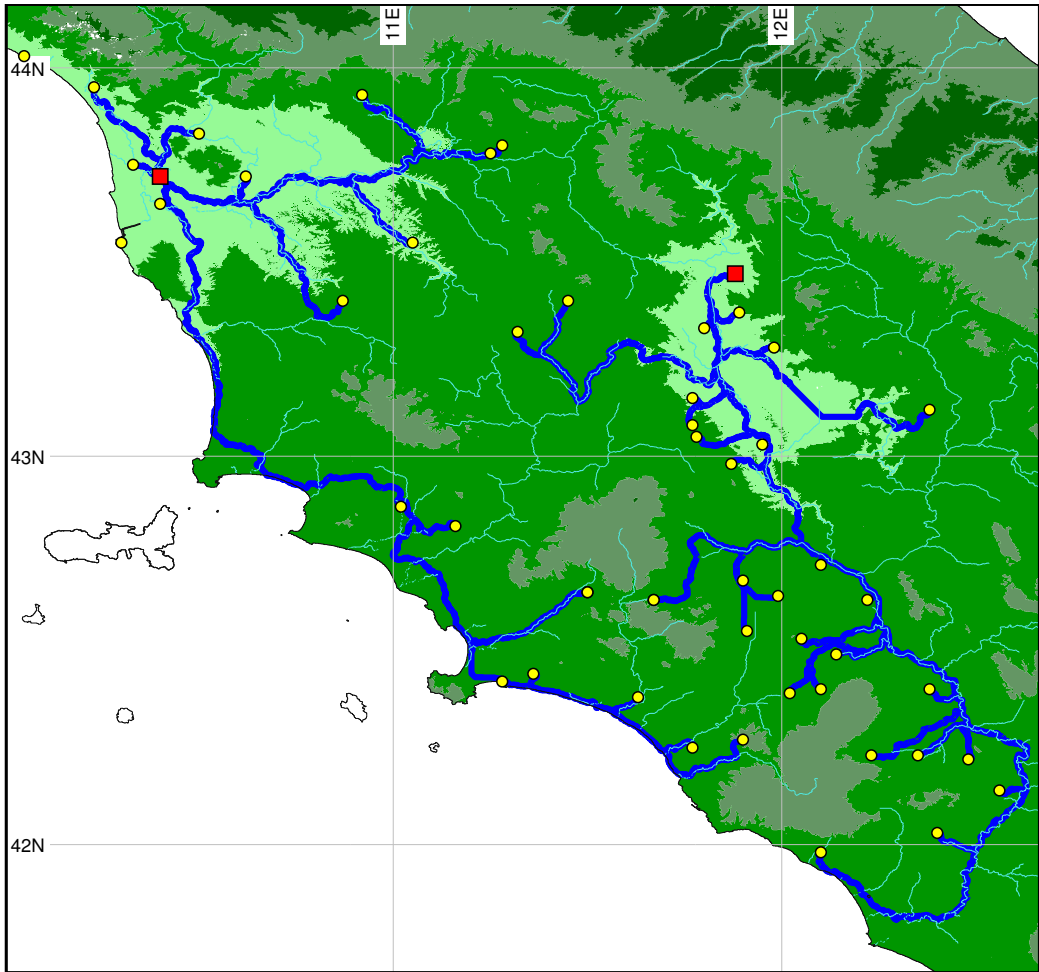


Figure 3.3: The combined accumulated travel cost map for Arretium and Pisa. The routes drawn on the map go to the one easiest to reach of these two locations.

covered.

The routes on the map present a picture which is very similar to what one might suppose when looking at the geography of the region, even when considering other possible methods of transport. The dominance of Arretium for the whole Tiber valley certainly is no surprise as it would be hard to imagine how Pisa could ever be profitable in comparison to Arretium in this area. On the other hand, the dominance of Pisa on the coast should be no surprise either. A slight surprise is, how easy it is to cover the whole valley of Arno all the way up to Florence from Pisa: On this map, the travel costs would not allow for Arretium to export its products even to Florence without losing competitiveness.

It is interesting how well this model, abstract and mathematical in its nature, fits with the observations presented in Basic distributions, esp. the data in table 1.5 and its analysis. In addition to being an observation based on the major producers' items, the presence of mostly Pisan products in the Fiesole-Florentia-area is also supported by the transport cost model presented

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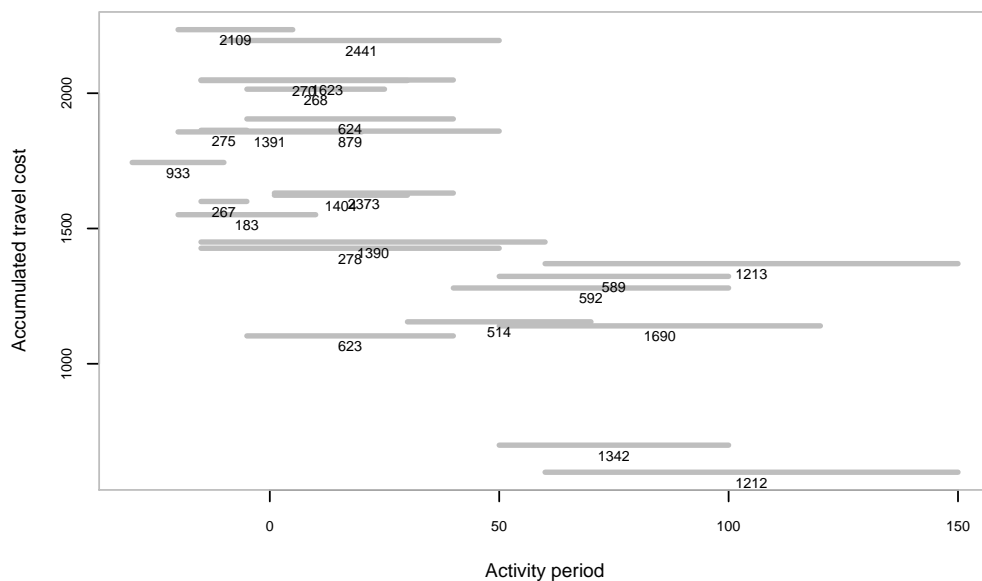


Figure 3.4: A plot summarizing the results above. The horizontal lines reflect the activity periods for each potter, shown as the OCK² code: for example, the potter 1212, shown as the lowest line, was active from ca. 60 CE to 150 CE, and the line marking him extends from 60 to 150 on the horizontal axis. The vertical axis, then, reflects the average travel cost for the items bearing this maker's stamp found in Etruria. The numbers on the left side are only relative, without any absolute meaning, but they are good in establishing the relationships between these potters. The number on the grey line is the potter number.

here.

In addition to the individual stamp types, the database also has data concerning the items which actually bear this stamp. As the stamp is mostly used in the production at one place, the stamp thus connects the items bearing this particular stamp to a productive organization, and to a geographical location of origin. The database has also information about the provenance of these items, meaning, what is the approximate context of their disposal. A large part of the items comes from sources that were badly documented, and therefore, the information in the database is not usable for reconstructing any small-scale patterns but for our purposes the accuracy is good enough. This means that for each stamp type ('potter' in the tables) we have a collection of items with a known location of recovery.

For each item, a sample of the value of the accumulated travel cost map at the location of recovery is taken. This value reflects the cost of transport for the item from the zero-point of that map to the location. We do this for both maps – the one zeroed on Arretium and the one on Pisa – and for each item for each potter, and then take the average from all items for one potter, thus getting one value for each map and each potter. This data is summarized in table table 3.1 on the facing page.

Potter	Pisa	Arretium	Difference (%)	Production location	Earliest	Latest
<u>933</u>	3405	1744	49	Arretium	-30	-10
<u>267</u>	3182	1600	50	Arretium	-15	-5
275	1693	1863	9	Arretium	-15	-5
<u>2109</u>	3050	2235	27	Arretium	-20	5
<u>183</u>	2724	1551	43	Arretium	-20	10
<u>1391</u>	3039	1857	39	Arretium	-20	20
270	2234	2047	8	Arretium/Pisa/Lyon	-15	30
<u>268</u>	2015	2146	6	Pisa	-5	25
371	2750	1259	54	?	-20	40
<u>1623</u>	4023	2049	49	Arretium	-15	40
<u>1404</u>	2262	1623	28	Arretium	1	30
278	1427	1985	28	Arretium/Pisa/Lyon	-15	50
<u>623</u>	4149	1103	73	Arretium	-5	40
<u>624</u>	4598	1905	59	Arretium	-5	40
<u>879</u>	3309	1860	44	Arretium?	-15	50
<u>2441</u>	3449	2195	36	Arretium?	-10	50
<u>2373</u>	3359	1631	51	Arretium	1	40
<u>1390</u>	2543	1450	43	Arretium	-15	60
<u>514</u>	2639	1155	56	Arretium	30	70
<u>592</u>	3511	1280	64	Arretium	40	100
<u>589</u>	3272	1323	60	Arretium	50	100
<u>1342</u>	699	2787	75	Pisa	50	100
<u>1690</u>	1140	2406	53	Pisa	50	120
<u>1212</u>	599	2544	76	Pisa	60	150
<u>1213</u>	1370	2730	50	Pisa	60	150

Table 3.1: A summary of the average travelling costs for each of the major potters in Etruria. ‘Potter’ shows the stamp code in the database. The figures in ‘Pisa’ and ‘Arretium’ are produced by taking for each item in the database bearing this potter stamp the travel cost from Pisa and Arretium to the place where it was found, and then averaging the results for each potter, both for Arretium and Pisa. The resulting figures thus show the average transport cost for each ‘product line’ that it actually incurred before reaching the place where it was found. The ‘Difference’ is the percentage of the difference in cost from the larger of the costs, i.e., the smaller cost is smaller by this percentage. ‘Earliest’ and ‘Latest’ limit the activity period of the potter, and the potters are ordered according to the midpoint of their activity periods; a minus before the number indicates BCE.

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There is a tendency of the average travel costs for the products to diminish over time; In fact, in a correlation analysis between the activity periods and the average accumulated travel costs the so-called Pearson correlation coefficient is -0.688 at a 0.01 significance level, which is a very strong result. This is already an indication of reasonable negative correlation between the production period and the distance over which the items travelled. The correlations indicate that in the earlier phases of the production, the products were in practice transported farther in the study region than in the later phases. This is even more evident when we look at a plot describing the activity periods and average accumulated travel cost from the production site for each potter in figure fig. 3.4 on page 68. Before 50 CE the average transport costs of the actual distributions were very high compared to the later potters, meaning that the items the potters active before 50 CE produced were taken much further from the production site within Etruria than was the case of the potters active after 50 CE.

The key point here is to understand what the accumulated travel cost actually means in relation to the commercialization of these items. As defined earlier, the accumulated cost reflects the amount of travel that was necessary to produce the kind of distributions we know about. In our definition, the travel cost is not something the actor in his time *chose* to have, it is something we can *show* happened. These items were in fact subject to that much of travel before reaching their final destination. If we assume that the reasons for their diffusion were economic, as we here do, then the travel costs indicate the amount of travel the actor behind the commercialization could sustain without it influencing the price he had to get for the item to such an extent that it would have become unfeasible to transport them that far.

In the table and graph presented above, there is a very strong difference between the early and late periods of *terra sigillata* production, the demarcation line running very close to 50 CE. The products of most of the potters active before 50 CE are able to sustain considerably larger transport costs than the products of the later periods. In practice, this means that the products of the early period are distributed over a wider area than the products of the later period. But what is also striking is that the transport cost as determining the distribution of the production actually seems to work. In the table table 3.1 on the preceding page, the underlined potter numbers mark the cases, where the lower cost was from the production place, and we see that almost without exception, this is the case with our potters. The distribution within the region starts from the production place, and obeys the dictates set by costs of transport.

A road can go where rivers don't flow nor ships sail

The argumentation thus far lacks one important feature: the possible differences of transport costs for different methods of transport. As shown in the beginning of this chapter it is commonly assumed that in pre-modern times, when mechanized transport was not yet available, the only profitable forms of transport used water ways, either rivers or the sea.

In the case of bulk commodities, I see no reason, why we should question the already traditional wisdom of the inexpensiveness of sea transport as compared to other forms of transport. But as stated already in the Introduction, the purpose of this analysis is not to study the global trade networks, but to analyze the regional practices – which are allowed for also by Yeo, as discussed earlier. He expressly cited ancient authors recounting the large herds of livestock that was driven to Rome over land, even as far as from Holland and the lowlands of the Rhine. Of course, in the case of livestock, the sea transport becomes much more complicated as the animals need to be fed and taken care of during the sea journey, and one can question whether the expenses incurred by loading and unloading the animals and providing them with the fodder was really less inexpensive than just to drive them along the roads.

Sea	River	Land	Source
1	4.9	42	Morley 1996, pp. 63–65: Edict and a papyrus.
1	5	25	Morley 1996, pp. 63–65: Morley's own figures.
1	4.7	22.6	Duncan-Jones 1982, p. 368.
1	3.9/7.7	42	DeLaine 1997, 210–211.
1		30.6	Laurence 1998, pp. 133–134.

Table 3.2: Relative costs for sea, river and land transport. These are relative costs in the sense that where the cost of transporting something over sea was 1 cost unit per 1 unit of distance, the cost for the same distance on land would be 42 units, in the case of Morley's first figures, and 4.9 units using rivers. The double number for the river cost from DeLaine is for downstream and upstream.

For bulk commodities like grain, oil and wine, the sea was the most inexpensive form of transport, which is reflected in the few sources we have remaining that consider transport costs. Even so, I should not disregard the possibility that rivers and the sea were used also on the regional level of potter trade in Etruria, and in the following, I try to address this question in a similar manner as presented above. This could have been done at the outset but this way it can be seen, what and how much changes when we include the variable costs of transport according to the method.

To analyze the effect of the different transport costs that were incurred by different transport methods, we need to have an assessment of the relative costs for different methods and a model of the transport networks for different methods (roads, rivers, the sea). On the matter of relative transport costs we are lucky in the way that the question has been of interest already for a long time. Richard Duncan-Jones was perhaps the one who addressed the question thoroughly for the first time²⁸, and he has been followed in this by for example Neville Morley in his study of the hinterland of the city of Rome²⁹ and Ray Laurence³⁰. A summary of their results can be seen in the table 3.2.

As we can see, there is some disagreement between these authors on the relative costs of land transport especially but the general trend is obvious – land transport was prohibitively expensive when compared sea and the rivers.³¹ Since the figures have been derived all from the same sources, and no one anymore believes that these sources would reflect anything but one particular situation in place and time, for the purposes of this study, I selected the figures of Morley (1 : 5 : 25) on the basis that they are easy to work with, and also because he has done a map of transport costs of the Roman hinterland based on these figures in this study.

The next thing is then to define the possible routes that could be used for different transport methods: roads, rivers and the sea. Sea is perhaps quite evident, but all the others have their own particularities, so it may be worth while to investigate each method separately.

²⁸ Duncan-Jones 1982; Duncan-Jones 1990.

²⁹ Morley 1996.

³⁰ Laurence 1998.

³¹ I find it hard to see how the figures from Morley and Laurence are so different when both claim to be using the figures for grain transport in Diocletians' Price Edict. According to Morley, the transport of grain cost 55 % of its value per hundred miles; Laurence, on the other had, claims that the price of the grain transported rose by 40 % per hundred miles. For sea transport both get 1.3 %. Morley 1996, pp. 63–65; Laurence 1998, pp. 132–133.

3. Routes of trade and transport

Road networks

The nature of the road network changed considerably during the Roman Republic. Via Clodia (soon after 281 BC) had still followed the old, Etruscan, routes, from village to village, but via Flaminia (220 BCE) and via Cassia (1st h. 2nd c. BCE) broke with tradition, following the old routes only incidentally, often avoiding the earlier centres. These soon became the arteries of commerce, and new centres sprang along them. New secondary roads were cut to connect these to the old centres. Some of the new centres were planned, but most were ‘natural accretions, vital, spontaneous growths, draining the old centres’.³²

However, evidence from surveys in Southern Etruria shows that the local network of smaller roads was dense, and it is probably safe to assume that if a need arose to get from one place to another, a relatively sensible route along the roads was available. As Ward-Perkins has noted, the road network of Southern Etruria was well developed already in the Etruscan times. As an example, he presents Veii, an important Etruscan town from which roads carrying heavy wheeled traffic radiated in every direction already in the 5th c. BCE.³³ The results of the South Etruria Survey confirm this view.³⁴ Earlier, it would have been right to assume that this dense network of roads was only a feature of the zones close to Rome where the land was valuable and densely populated, but recent work on the northern Etruria has revealed that also there, the road network seems to have been relatively dense, providing ample routes of traffic.³⁵ The evidence of a direct road connection along the valley of Arno from Florence to Pisa is well known.³⁶ The *Ager Capenas* study survey demonstrated well the density of the road network in the area as well as the different levels of road networks, from statal highways, like *via Falminia* and *via Tiberina*, to the local roads only half the width but still covered in stone blocks and the mere gravel roads.³⁷

For the purpose of this study, I have thus not deemed it worth while trying to reconstruct the existing regional road network at the time. First of all, it is not even possible while detailed enough studies of the whole Tuscan territory do not exist. Secondly, there seems to be every reason to suppose that as pointed out above, the road network was so dense that if a route was needed, it was also found. Also, for the spatial level of the practices we are looking at, the actors would have been knowledgeable about the local environment, and not dependent only on the major arteries when travelling around Etruria. In the following analysis, then, a road is considered to exist in all those places which were suitable for a road in the first place, based on the form of the terrain. Which is just what the analysis used above and below will tell.

Local sea transport

The importance of sea as a route of travel and transport is demonstrated by the description of the Etrurian coast line by Strabo. On the Etrurian coast, Strabo lists in his work on geography five harbours, four explicitly and one implicitly. The most northerly of these sites is Luni which lies slightly outside our region, being situated on the coast approx. 50 km north of the current mouth of the Arno river. Strabo describes a mighty harbour site at Luni, appropriate for the former center of the maritime power Etruria used to be. This was also the source for much of the high-quality marble used in major buildings at Rome and other towns.³⁸

32 Ward-Perkins 1957, p. 398.

33 Ibid., p. 140.

34 Potter 1979.

35 Pasquinucci and Menchelli 1999, p. 125.

36 ILS, 5808.

37 Jones 1963, 130–132, 135–137.

38 Strabo, 2.5 Strabo’s interpretation has of course been contested, and it has been suggested that the harbour he actually meant was the bay of La Spezia, which is a huge natural bay with a width of 3 km. Stefan Radt, editing

Next site with a harbour, in this case only an implied one, is Pisa, which was, after Strabo, located at the confluence of the rivers Arno and Auser, some 20 *stadia* from the sea.³⁹ The river part from Pisa to the sea was very rough as a result of the confluence of the rivers, at the point of which the waves were so high that one could hardly see across the river, notes Strabo.⁴⁰ We can still conclude that this is navigable, even though challenging, and taking into account, how much export from Pisa to Rome Strabo recounts, there must have been a harbour here, which was also confirmed some years back when remains of ancient ships were discovered in the western outskirts of modern Pisa.⁴¹

After Pisa, the next notable harbour on the coast was to be found by Populonia. The town itself was at the top of the high promontory, but at the foot of the hill was the actual harbour with two boat houses. According to Strabo, the town itself was almost deserted but the harbour was good, and there was a lot of iron smelting going on in the region. The iron ore originated from the isle of Aithalos, modern Elba, where it for some reason could not be smelted well enough, and therefore was brought to the mainland for processing. The harbour of Populonia was also the main point of departure for ships going to the islands of Aithalos, Kyrnos (Corsica) and Sardo (Sardinia).⁴² Giulio Ciampoltrini, who has reviewed the epigraphic evidence from the area of the supposed harbour, has come to the conclusion that during the late Republican and Augustan times there was a lively community at the harbour site, with an urban upper class, a group of freedmen with familial contacts to Volaterrae and a group of professionals of servile origins.⁴³

Next town described by Strabo as having a harbour was Cosa. Again, the harbour was located just below the hill on which the town itself stands.⁴⁴ Where exactly this harbour was has been a hotly debated issue but that does not need to concern us as both candidates for the Cosa harbour do have remains of port structures dating to our period. The site of 'Porto Ercole' is situated somewhat west of Cosa, on the eastern side of the present-day *Monte Argentario*; the other candidate, the site called *Tagliata* is located just below Cosa, on the eastern side of the hill on which the town stands.⁴⁵ It seems probable that there were actually two port installations in the area, and that they seem to have functioned at the same time.

This does not even seem excessive as Strabo tells us about a tunny watch that was close to the town. This was a watch-out for the tunny shoals following their food along the coast. The presence of a well-known watch of this kind definitely points towards the presence of some kind of fishing industry in the area at the time of Strabo's writing,⁴⁶ and the presence of harbour facilities at two different locations does not seem too far-fetched a conclusion.

The next explicitly stated harbour after Cosa is Pyrgi, also called the port of Caere, some 30 *stadia* away. But in addition to this harbour, Strabo also recounts that when sailing from Cosa to

Strabo's work, concludes that Strabo did indeed mean Luni, and that the identification of this harbour with the bay of La Spezia is misguided. Radt also reminds us that in antiquity, Luni was situated on the coast, whereas today, the ruins are almost 3 km from the shore. Radt 2007, pp. 37–38. We simply do not know, how the coast looked like then.

39 How much this actually is, is open to negotiations, as the length of the *stadiou* was variable, and understood to be so even by the ancient authors themselves. 20 *stadia* is somewhere around 3½ kms. See for example Gulbekian 1987 for the various lengths of the *stadiou*.

40 Strabo, 5.2.5.

41 For an overview and a further bibliography on the ongoing excavations, see Bruni 2010.

42 Strabo, 5.2.6.

43 Ciampoltrini 1991, p. 257.

44 Strabo, 5.2.8.

45 McCann 1987, pp. 56–58 summarizes the nature of the discussion well, and does provide us with the necessary information that both of the debated sites did have port structures dating to this period. Whichever of them was *the* harbour of Cosa may be an interesting debate in itself but does not need to concern us further.

46 Strabo, 5.2.8.

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Ostia, there are small towns on the way, namely Gravisca, Pyrgi, Alsiom and Fregena. Of these, only Pyrgi is explicitly mentioned as harbour but in this case Strabo may have brought it up especially in its function as the port of Caere, which was an important center in its own right. Even though the other towns are only mentioned by name and not explicitly as harbours, the use of the verb παραπλέω ('flow by') indicates that Strabo's description moved by ship at this point, and the places mentioned could just as well have been small ports in their own right, without this fact needing an explicit mention; at least Strabo's description does not exclude this possibility.⁴⁷ In fact, I find it very strange to think that these places on the coast would *not* have had any kind of port facilities – a town on the coast with no boats sounds a very unlikely scenario.

Archaeological remains allow us to say something more of these sites. At Gravisca, excavations and underwater survey have revealed remains of port structures, and this place was the port of Tarquinia, one of the most important towns of Etruscan origin in the region.⁴⁸ Pyrgi and Castrum Novum were both ports of Caere.⁴⁹

So from this description by Strabo with some added archaeological evidence we see that port facilities were relatively dense on the coast. In addition to this, a comparison with later practices of coastal trade points out that in fact small trading vessels would not even need a port to perform their commercial activities: in tidal areas they could simply be beached, and in areas with no or little tide, winched to the shore or moored to posts in shallow waters. In all cases, loading and unloading of cargo could be easily performed without needing any port facilities. It is notable that these practices were not limited to small vessels as as late as in the 1880s, British colliers – bulk cargo ships with flat-bottomed hulls – of up to 140 tons in size were beached and winched ashore.⁵⁰

To combine Strabo's description with the comparative material it is perhaps safe to assume that for trading networks on the scale of this particular analysis, the possibilities for loading and unloading the ships were ubiquitous. Although the actual ports Strabo cites are only five in number, they should perhaps be understood more as the kind of ports where the ships could take a storm or two, and spend many days in rationing, buying and selling; for traders and products going to particular places, these were not the only places where one could get off the ship. It is also well worth remembering that for the goods to move from the sea-going ships to the river boats, one does not need a port; the items could well be transported from one ship directly to another.⁵¹

From this quick view on the port facilities and the practices of loading and unloading the ships, two conclusions can be drawn. First, that there was sailing activity along the coast; and second, that for the purposes of this study, there is no need to limit the interaction between the sea and the land to only the places where we can demonstrate a harbour existed. The interaction between land and sea and sea and the river network could take place where it was deemed necessary.

Canals

Although there is no evidence of actual canals in Etruria, the idea of canal building was not foreign to the Romans. Then governor in Bithynia, Pliny the Younger requests in his letter to

47 Strabo, 5.2.8: ἀπο δὲ τῶν Κοσσῶν εἰς Ὀστια παραπλεύουσι πολίχνηά ἐστι Γραουίσκοι καὶ Πύργοι καὶ Ἄλσιον καὶ Φρεγγῆνα.

48 Papi 2000, pp. 65–66; Shuey 1981.

49 Papi 2000, p. 32.

50 Houston 1988, 560–561.

51 Demonstrated for example by the mosaic of the room 25 at the *Piazzale delle Corporazioni* in Ostia where the sea-going transport vessel and the river boat (*nave caudicaria*) are moored one by another, and a bearer is carrying an amphora from the sea vessel to the river ship using a gangplank. See Le Gall 2005, 279–281.

the Emperor Trajan that a canal should be built from the lake close by to Nicomedia, to ease the transport of marble, farm produce, wood and timber to the town. He explains that the lake is used to transport these easily, but that the products must then be transported to the town by carts, which is difficult and expensive.⁵² In this particular case, Trajan was not immediately favourable to the request⁵³, but it is evident from the exchange of letters that the cost and effort of transport were indeed well understood. A realised project is known from slightly earlier times, as Strabo records that a canal was built from the Po to Parma, around the same time that the *via aemilia scaura* was built from Pisa to Placentia via Genoa – responsible for both was Marcus Aemilius Scaurus.⁵⁴

Canals perhaps should not be considered separately from rivers as traffic infrastructure, for as we will see below, considerable effort was spent in certain places to keep the rivers navigable; in the case of Etruria, the terrain had no obvious places where the construction of actual canals as separate from the existing rivers would have been possible, with the exception of the Clanis valley, of which more below.

River network

As we saw earlier, while writing about the amount of construction going on in Rome, and the amounts of supplies from the mines and the timber transported to Rome for this purpose, Strabo emphasizes the importance of rivers as transport routes for construction material. The rivers used for this are Anio, from Alba, the Latin city next to Marsi; Nar and Teneas which run through Ombricia down to Tiber; and Clanis, which runs through Tyrrhenia and the territory of Clusium.⁵⁵ He also notes that the construction projects planned by Caesar would have failed by now⁵⁶, unless the mines, the timber and the easy means of transport by water had held out. This is an obvious indicator that in Strabo's view water was the only sensible method of transport for these heavy loads, and a necessary requirement for providing the city of Rome with adequate amounts of construction materials.⁵⁷

52 Plin. ep., 10.41: 2 *Est in Nicomedensium finibus amplissimus lacus. Per hunc marmora fructus ligna materiae et sumptu modico et labore usque ad viam navibus, inde magno labore maiore impendio vehiculis ad mare devehuntur ... hos opus multas manus poscit. At eae posso non desunt. Nam et in agris magna copia est hominum et maxima in civitate, certaue spes omnes libentissime aggressuros opus omnibus fructuosum.* 3 *Superet ut tu libratores vel architectum si tibi videbitur mittas, qui diligenter exploret, sitne lacus altior mari, quem artifices regionis huius quadraginta cubitis altiozem esse contendunt.* 4 *Ego per eadem loca invenio fossam a rege percussam, sen incertum utrum ad colligendum umorem circumiacentium agrorum an ad committendum flumini lacum; est enim imperfecta. Hoc quoque dubium, intercepto rege mortalitate an desperato operis effectu.* 5 *Sed hoc ipso - feres enim me ambitiosum pro tua gloria - incitor et accendor, ut cupiuam peragi a te quae tantum coeperant reges.*

53 Plin. ep. 10.42: *Potest nos sollicitare lacus iste, ut committere illum mari velimus; sed plane explorandum est diligenter, ne si emissus in mare fuerit totus effluat certa, quantum aquarum et unde accipiat. Poteris a Calpurnio Macro petere libratores, et ego hinc aliquem tibi peritum eius modi operum mittam.* To understand this reply of Trajan as a refusal of the whole project, like Laurence 1998, pp. 119-120 is too harsh an interpretation – Trajan only notes that the matter should be researched carefully ("plane explorandum est diligenter"), and that Pliny should use these resources in investigating the matter. Or perhaps Laurence sees the non-existence of such a canal today as the proof of Trajan's refusal? That would be jumping to conclusions as there are various reasons why a project once started (but not necessarily finished!) would not be visible any more. Instead of showing Trajan's refusal, this part should be seen as showing his measured support for the project.

54 Strabo, 5.1.11: ... ἀλλ' ἀνέψυξε τὰ πεδία ὁ Σκαῦρος διώρυγας πλωτὰς ἀπὸ τοῦ Πάδου μέχρι Πάρμης ἄγων (...). οὗτος δὲ ὁ Σκαῦρος ἐστὶ ὁ καὶ τὴν Αἰμιλιαν ὁδὸν στρώσας τὴν διὰ Πισῶν καὶ Λούνης μέχρι Σαβάτων κἀντεῦθεν διὰ Δέρθωνος.

55 Strabo, 5.3.7. See footnote 6 on page 60.

56 Strabo's knowledge comes from the period between 20 BCE and 23 CE.

57 However, the analysis of the construction process of the baths of Caracalla in DeLaine 1995 emphasizes the impressive amount of land transport required for the completion of the construction. Whatever the original source of construction material in this case is, land transport would still have been required as Tiber does not flow just by

On the other hand, what would Strabo know about land transport? The answer to this simple critical question can be reformulated in terms of Strabo's method: how did he gather his information? Strabo may well have been a prisoner of his own preconceptions – his description might just as well reflect the 'traditional wisdom' and 'what everybody knows'. Most certainly his assessment was not based on any quantitative analysis of the amounts of construction materials reaching Rome by different forms of transport, so even though we may well accept Strabo's opinion as reflecting the *ideas* an upper-class author had of the transport, and even further, to reflect his assumptions what his supposed reader was thinking about the matter, we cannot accept his statement at face value. With this criticism I am not trying to argue that there was no water transport nor that the water transport was not important but to say that *even if there had been* large amounts of land transport, *Strabo might not know about it!* But what we can relatively safely assume based on Strabo is that the rivers he noted most probably were navigable – and even here we have to note that the nature of Strabo's knowledge was such that although the rivers he mentions can be assumed to have been navigable, those may not have been the *only* navigable rivers. This discussion applies of course to the other classical authors, too, and Strabo is not the only one writing about rivers; for example Dionysius of Halicarnassus has a long description of the importance of Tiber as a transport way for Rome. In his text, which he wrote sometimes during the reign of Augustus, he describes the improvements made to the city by one of the legendary kings, Marcius. These improvements included the grounding of Ostia as an harbour at the mouth of the river Tiber, a river that was well navigable to its upper reaches by boats and all the way up to Rome by sea-going ships. Also here, the perspective, when describing ships entering the river and being towed up to Rome and the even larger ones that are anchored by the mouth of the river and unloaded and loaded by river boats, was definitively in his own time.⁵⁸

An easy assumption of the navigability of the rivers would also be that the only rivers suitable for water transport in Roman Italy were Tiber, Arno and Po.⁵⁹ However, I find this assumption too simplistic if for not other reason than for the information given by Pliny the Elder: On the Tyrrhenian coast of Central Italy, the navigable rivers were Tiber and Umbro (Ombrone). And even though the alluvial valley of Clanis began to turn into wetland in the classical times, according to Pliny the Elder, the river was still navigable in his time, and flat-bottomed boats were used to transport products from the valley. In the upper reaches of the river valley, sluice gates were used to collect water, and boats could thus sail only periodically. Pliny writes that without rain it took nine days to collect enough water for the boats.⁶⁰ What of course is very interesting in this description, is the amount of central organization it presupposes. The whole procedure described by Pliny requires that the sluice gates are operated all over the Clanis valley in a similar manner, and that they are opened all at the right time to produce the necessary flow in the channels and in the river itself.⁶¹ The same kind of procedure has been suggested for the *fosso di Grotta Oscura*, some 15km north of Rome, as its banks are full of remains of related constructions: channels leading water from other sources, possible reservoirs and gate systems.

the construction site but around 1 km away.

58 Dion. Hal. *Ant. Rom.*, 3.44.1–4 . . . ἰκανοῦ δὲ ὄντος ἄχρου μὲν τῶν πηγῶν ποταμηγοῖς σκάφῃσιν εὐμεγέθεσιν ἀναπλεῖσθαι, πτὸς αὐτὴν δὲ τὴν Ῥώμην καὶ θαλαττίας ὀκάσι μεγάλας . . . αἱ μὲν οὖν ἐπίκωποι νῆες ὀπηλίαι ποτ' ἂν οὔσαι τύχῳσι καὶ τῶν ὀλκάδων αἱ μέχρι τρισχιλιοφόρων εἰσάγουσι τε διὰ τοῦ στόματος αὐτοῦ καὶ μέχρι τῆς Ῥώμης εἰρεσίᾳ καὶ ῥύμασι παρελκόμενα κομίζονται, αἱ δὲ μείζους πρὸ τοῦ στόματος ἐπ' ἀγκυρῶν σαλεύουσι ταῖς ποταμηγοῖς ἀπογεμίζονταί τε καὶ ἀντιφορτίζονται σκάφας.

59 Morley 1996, p. 66, where Morley just notes that in addition to Tiber, of the Italian rivers only Arno and Po are large enough to have been used regularly for transport.

60 Plin. *HN*, 3.27. Alexander 1984 has a detailed account of the projects of reclamation of the Clanis valley.

61 According to Quilici, local people in the area could point to places, where remains of gates were still visible in the 1950's before they were finally flooded away. Quilici 1986, 215–216, n. 92.

Based on these, Lorenzo Quilici has suggested that also here the water might be collected and then periodically released to enable the transport of heavy loads in the small stream.⁶² This obviously points to a strong institutional interest in keeping the rivers navigable, most probably because of transport need. We have little information about the actual policies of the Roman state concerning rivers and their upkeep, except for the officials called *curatores riparum et alvei Tiberis*. Le Gall has gathered evidence relative to these officials. His conclusion is that they were instituted in the year 15 BCE as a five man commission. Le Gall also comes to the conclusion that the area of their responsibility extended to the whole river, as they were cited in the sources as responsible for the level of the river which they were supposed to keep as constant as possible.⁶³ Based on this, it is a credible assumption that the sluice gates and their operation in the Clanis valley (which was part of the Tiber basin) were under the jurisdiction and responsibility of these five officials, and that therefore, the sluice gates were not a local innovation but reflected the active policies of the state.

Also the river Ombrone on the coast was navigable as stated by Pliny.⁶⁴ But it is to be noted that in his list, Pliny cites as navigable rivers on the Tyrrhenian coast only Tiber and Ombrone; Arno, contrary to what one might expect, was not included in the list. In fact, Arno was not navigable very far from the sea. Somewhat below Florence, the river flows between the hills and the fall is enough to create some rapids that prevented navigation at that point of the river: this was the reason why Leonardo Da Vinci later planned a scheme to divert Arno to a channel that would have circumvented the rapids at Signa.⁶⁵

Also Clitumnus (modern *Clitunno*) was navigable according to Pliny the Younger who describes its sources as being very voluminous. It soon becomes a great river, and is navigable even for large vessels. According to Pliny, its current is strong not so much because the land slopes but because of the large amount of water coming from the source. He also writes that is easy to navigate downstream, and the boats do not need their oars that much but hard to sail upstream, even with the aid of oars and poles.⁶⁶

The information provided by the literary source is thus somewhat haphazard, and I'd be reluctant to identify *only* those rivers as navigable that were mentioned as such in these geographical presentations. However, on the basis of this navigability information it is possible to study the navigability with a geographical model.

Water flows downwards

We know from the sources that for example Tiber was navigable at least as far as Timia, probably even farther as Strabo⁶⁷ states that also Timia was navigable. Also, a river port has been discovered at Pagliano on the Paglia river, a tributary of Tiber, approximately 6 km north of Orvieto. This indicates that the river was usable for transport at least up to this height in classical times. It has been suggested that this was the port used to transport the millstones produced in the Orvieto region.⁶⁸

In a simplified model, we might assume that the navigability of a river depends mostly on the amount of water it gets. As the region is relatively homogeneous in its climate, and the rivers of the region differ mostly in size, not so much in type, we could assume that the navigability of

62 Ibid., pp. 210–211.

63 Le Gall 2005, pp. 155–156, 200.

64 Plin. *HN*, 3.26: *Hinc amnes prile, mox vmbro, navigiorum capax...*

65 Masters 1998 describes this plan and its fate in great detail.

66 Plin. *ep.*, 8,8.

67 5.3.7, see footnote 6 on page 60.

68 Tamburini 1990; Antonelli, Nappi and Lazzarini 2001.

3. Routes of trade and transport

River	Area (km ²)	Area (km ²), Le Gall	Area (km ²), Wikipedia
Anio	1,284	1,115	1,414
Nar	3,588	4,020	4,280
Timia	1,951	1,956	1,231
Clanis	1,253	1,320	
Ombrone	4,384		

Table 3.3: The catchment areas for the navigable tributaries of Tiber. First the area calculated from our model, next the area from Le Gall 2005, p. 13, and the last column has the areas as reported on Wikipedia.

the river depends mostly on its catchment area. I have recreated the catchment areas for some of the rivers mentioned in the literary sources using the `r.watershed` module of the GRASS system. The sizes of the catchment areas for certain rivers are presented in the table table 3.3 on the current page. There is good support for this simple assumption for example in the comparison of the annual flows and the sizes of the basins of the Tiber and its confluences presented by Le Gall.⁶⁹

The presence of the port at Pagliano gives us then a method to analyze the navigability of the rivers based on the DEM of Etruria. Based on the assumption that the navigability of a river depends on the amount of water flowing in it, and that this amount depends roughly on the amount of land from which the rain and melting water flow to the river, it is possible to make a model of navigable rivers from the DEM. At first, the amount of overland flow for each cell of the model is calculated using a flow modelling algorithm. The direction of the flows always being downwards the amount of flow at probable river cells is clearly larger than at the surrounding, non-river cells.⁷⁰

Then, if we measure the amount of flow at the Paglia river at the site of Pagliano, we can use this value to estimate the usability of other rivers for transport. A river in this model is formed by a sequence of cells with diminishing values starting from the mouth of the river. Therefore, if we select only the cells having a value larger than the value gotten from the Pagliano site, what remains is a raster map having values only on probable navigable rivers.

As we see from the table, the two smallest rivers known to have been navigable are Anio and Clanis, with respective catchment areas of 1,284 and 1,253 km². But even these figures are too large, as especially in the case of Anio we have to remember that the travertine quarries whose products Anio was used to transport are not located at the confluence of Anio with Tiber but some tens of kilometres upstream. In fact, Strabo describes Anio as being navigable below Tibur, after the great waterfalls.⁷¹ Also in the case of Clanis, with the artificial sluice gates mentioned earlier, the area that actually supported a navigable river system was smaller than the one in the table. For the figure of Clanis, only the valley of the modern ‘Canale Maestra’ is calculated as this is clearly the area from which the flat-bottomed boats brought the products to the markets

69 Le Gall 2005, 13, fig. 4.

70 A detailed explanation of these methods and the various factors included can be found for example in Vogt, Colombo and Bertolo 2003, pp. 282–285.

71 Strabo, 5.3.11: Τίβουρα μὲν ἦ τὸ Ἡρακλείον καὶ ὁ καταρράκτης ὃν ποιεῖ ὁ Ἀνίων ἀπ’ ὕψους μεγάλου καταπίπτω εἰς φάραγγα βαθύειαν καὶ καταλοσῆ πρὸς αὐτῇ πόλει. ἐντεῦθε δὲ πλωτὸς ὢν διέξεισι πεδῖον εὐκαρπύτατον παρὰ τὰ μέταλλα τοῦ λίθου τοῦ Τιβουρτίου καὶ τοῦ ἐν Γαβίοις τοῦ καὶ ἐρυθροῦ λεγομένου, ὥστε τὴν ἐκ τῶν μετάλλων ἐξαγωγὴν καὶ τὴν πορθμεῖαν εὐμαρῆ τελέως εἶναι, τῶν πλείστων ἔργων τῆς Ῥώμης ἐντεῦθεν κατασκευαζομένων. Here Strabo also notes how most of the construction sites in Rome were supplied from these quarries.

of Rome. This figure does not take into account the amount of water that might have flowed to the Clanis from Arno but since according to Pliny⁷² only the upper reaches of Clanis were difficult to navigate and required the active use of sluice gates to collect enough water, the inflow from Arno must have been negligible.

As a compromise I would suggest that the area obtained for these smallest rivers, 1200 km², provides enough water for a river to be navigable in this geographical setting.⁷³

This figure is probably still too high, as the catchment area of Anio is not much larger, and this figure leaves the navigability of Anio to the last 7.5 km before its confluence into Tiber.⁷⁴ However, by overestimating the catchment area of a river, we at least will be on the safe side of the analysis.

The actual process of map creation, however, is slightly problematic, because, as noted earlier, the course of the river Clanis has later been changed to run into Arno instead of Tiber. The few hundred years since that have changed the terrain so that a DEM reflects already the new flow patterns, the valley of Clanis always having been very flat, and the river network in Classical times has to be reconstructed manually. In this case, I opted for the following:

Most of the rivers are based on the amount of flow defined earlier. This enables us to reconstruct the main rivers of the region, and most of the rivers mentioned also in the sources. Then, at the end, the river Clanis is added manually, using a least cost route following the bottom of the still existing Chiana valley – the same route that actually appears in the maps earlier. In addition, the river Arno has been broken a short distance below Florence to reflect the fact that it most probably was not navigable at this point. In the model, then, this trip has to be taken overland with all the unloading and loading costs included. The results can be seen in the figure fig. 3.5 on the next page.

First the cart, then the boat

We have gathered now all the necessary data we need to use the estimates for the different costs for different forms of transport in our analysis. The sea has thus been given a value of one, being the most economical form of transport. The river network created above is given a relational value of five to make it five times more costly than the sea. Land, which fills most of the area, has the basic cost multiplier of 25. In addition to these, to somehow reflect the effort needed to load and unload items to and from floating vessels, a small buffer zone has been created around all waterways. This zone is one raster cell wide, and has the cost multiplier of 250, ten times the multiplier of land transport, making loading the boats to correspond to a roughly one kilometer travel on land.

At this point, to create the accumulated travel cost maps the procedure is essentially the same that was used in the previous case, in section 3, with the exception that in addition to the basic DEM of the region, the GRASS module *r.cost* was also given the model reflecting the differing costs for the sea, river and land with the buffer zones giving the cost from crossing from one type

72 Plin. *HN*, 3.27.

73 The natural geographer reading this is bound to cringe at this assumption, as the amount of flow in a river depends on much more than just the size of the catchment area. Climate and the nature of the soil are important factors, and even though both of these can vary regionally so that even within the study region there might be differences, a thorough, complete study of the catchment areas and water flows of each of these rivers in antiquity would be a matter of a book of its own.

74 But as Strabo 5.3.7 already told us (See footnote footnote 6 on page 60), Anio was used for transporting construction material to Rome. Agostini 2007, p. 113. This material probably originated in the Travertine quarries north of the Anio river, between Bagno di Tivoli and Pontelucano, for which see for example Ford and Pedley 1996, pp. 134–135. Carta Geologica d'Italia 1 : 100 000 F. 150 shows the extents of the travertine sedimentations.

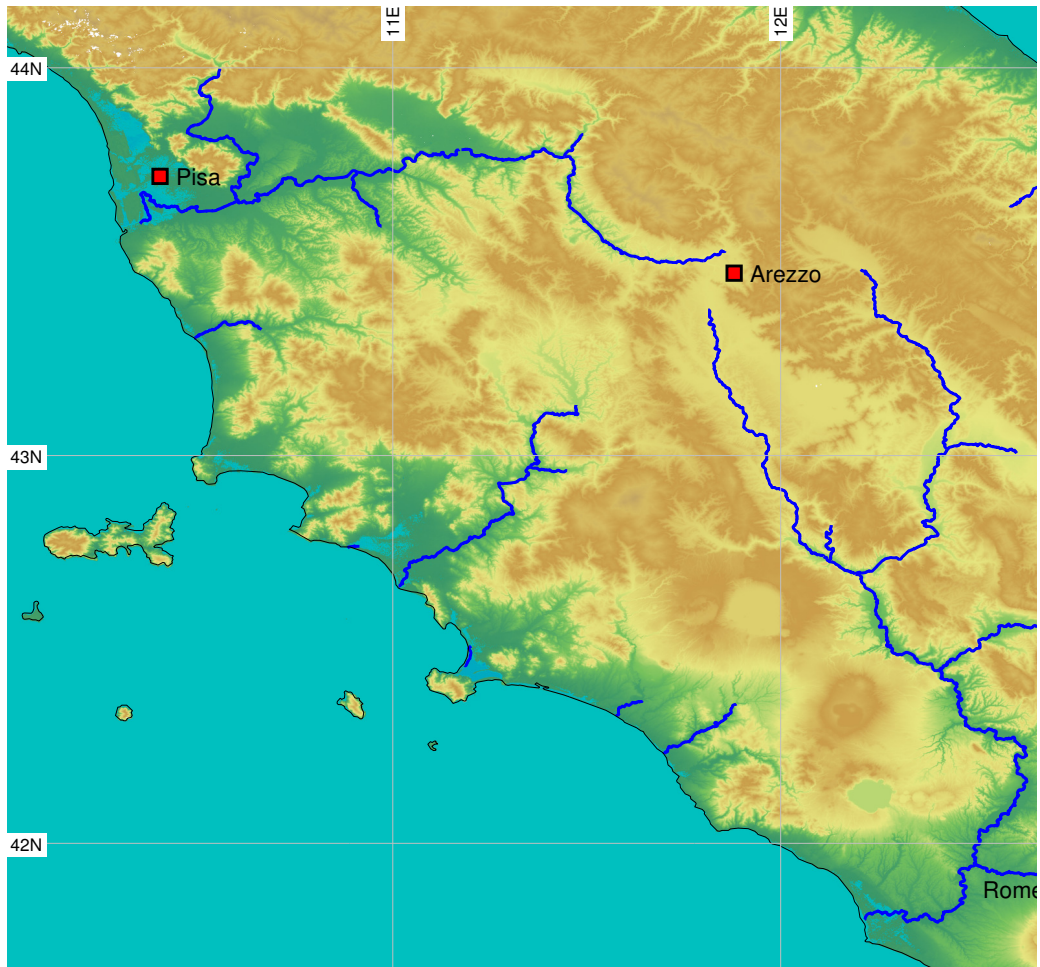


Figure 3.5: The reconstructed river network of Etruria, based on the position of the river port at Pagliano.

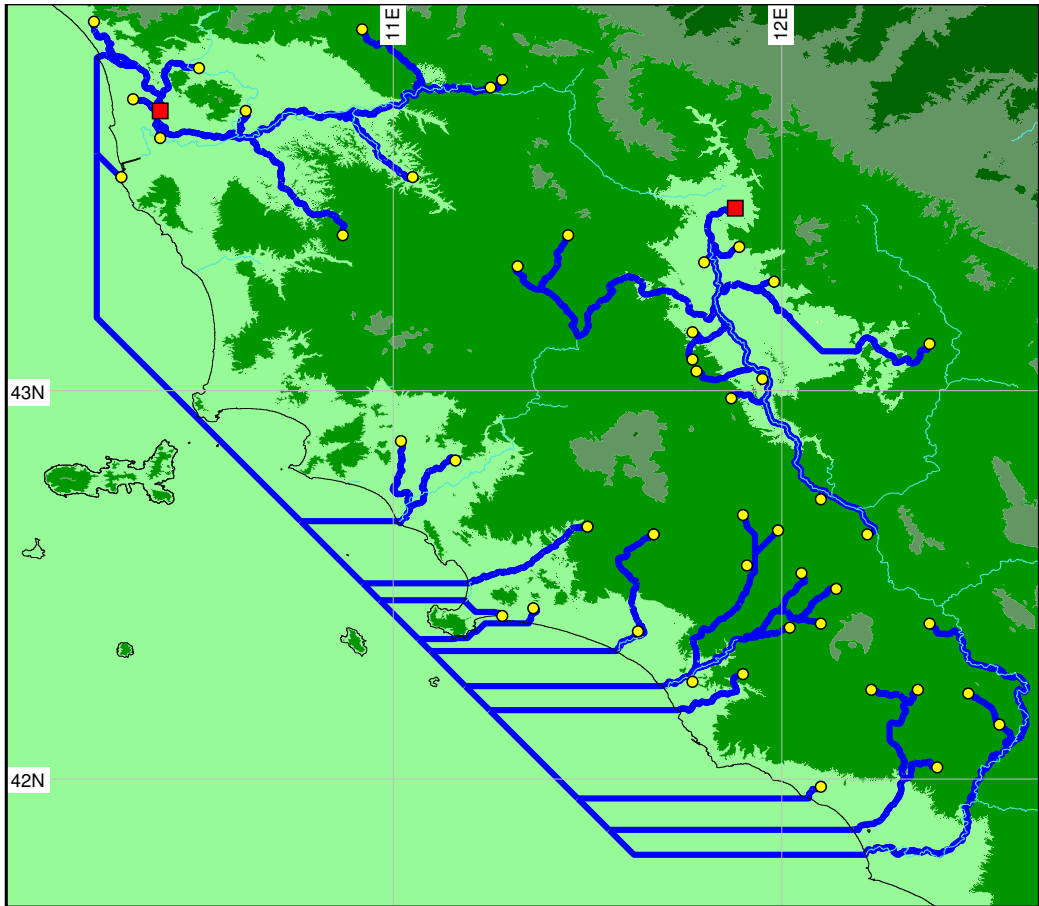


Figure 3.6: The combined accumulated travel cost maps for Arretium and Pisa. The routes, once again, show the optimal route to the places easier to reach from these two towns.

of transport to the other.⁷⁵

With this data, similar accumulated travel cost maps as in the previous section were created, and the combined least-cost-route map is shown in figure fig. 3.6 on this page.

Now, the differences from the previous map of the same kind (see figure fig. 3.3 on page 67) are obvious. Inland, the routes do not change much, as also the earlier ones did follow the valley floors. But now, the added possibility of sea transport, with its considerably smaller costs, extends the Pisa profitability zone all the way up the river Tiber. On this map, it would be as costly to take the items over the sea and up one fourth of the Tiber as to bring it down from Arretium using only river transport. Another obvious change is visible on the coastal areas where the inclusion of sea as possible transport route has dramatically changed the situation. No routes at all follow the coast any more, and everything moves by the sea, according to this model, and it is even possible to take items from Pisa via sea to Tiber and take them upstream beyond Rome.

When we take the accumulated costs for each stamp (as we also did in the previous section),

⁷⁵ In fact, the `r.cost` module was also given a similar map in the previous case, but it had the value '1' for each map cell, to reflect the uniform cost of travel.

3. Routes of trade and transport

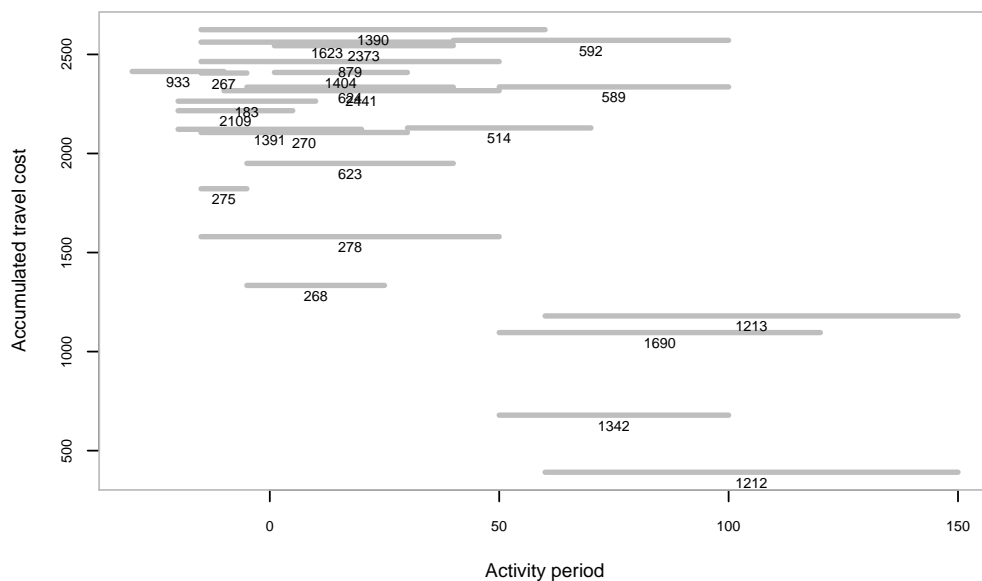


Figure 3.7: A graph showing the average accumulated transport cost for each potter represented as a line reflecting the activity period.

we can make graphs similar to the ones presented earlier. A summary of the costs and activity periods is shown in figure 3.7.

At first sight, things do not seem too different. Even here, we see the higher average costs in the earlier phase, although in this case, there are obviously some stamps that can take costs as high as during the first half of the 1st century AD also during the second half of the century, whereas in the earlier case, the costs that the stamps did bear dropped dramatically around the year 50.

In fact, in order to understand the results of this new analysis, we have to present a similar table as in the previous case (See table table 3.1 on page 69). In the new version of the table (3.4) we see the emergence of a very different kind of picture. In the first case, there was only one potter (275), for whose products the accumulated travel cost from Arretium, the production place, was *higher* than from the other main production site, Pisa. Now, in this second table, we see that this is the case for seven potters! (The potters 933, 267, 275, 2109, 1404, 879 and 2441, in the order they appear in the table.)

To understand this, we need to consider the concrete meaning of this change. In this second table, where the differences in transport costs using different methods of transport are taken into account, the products of seven Arretine potters seem to have been distributed in areas, which would have been better served by producing the items at Pisa. For the demonstrable distributions of these potters, Pisa actually would have been a more profitable place for production. On the other hand, the difference is never very big: the percentages (see the column Difference) are in most cases below 20 % meaning that it was at most 20 % cheaper to transport these items from Arretium than Pisa in order to get the distribution that we know from our data. (The exception

Potter	Pisa	Arretium	Difference (%)	Production location	Earliest	Latest
933	2414	2705	11	Arretium	-30	-10
267	2406	2447	2	Arretium	-15	-5
275	1822	2507	27	Arretium	-15	-5
2109	2216	2747	19	Arretium	-20	5
<u>183</u>	2622	2264	14	Arretium	-20	10
<u>1391</u>	2804	2122	24	Arretium	-20	20
2585	2625	2263	14	?		
270	2106	2671	21	Arretium/Pisa/Lyon	-15	30
<u>268</u>	1334	2517	47	Pisa	-5	25
371	2249	2574	13	?	-20	40
<u>1623</u>	2854	2562	10	Arretium	-15	40
1404	2409	2567	6	Arretium	1	30
278	1580	2545	38	Arretium/Pisa/Lyon	-15	50
<u>623</u>	3158	1950	38	Arretium	-5	40
<u>624</u>	3295	2335	29	Arretium	-5	40
879	2464	2787	12	Arretium [?]	-15	50
2441	2317	2785	17	Arretium [?]	-10	50
<u>2373</u>	2722	2544	7	Arretium	1	40
<u>1390</u>	2787	2625	6	Arretium	-15	60
<u>514</u>	3223	2129	34	Arretium	30	70
<u>592</u>	2737	2571	6	Arretium	40	100
<u>589</u>	3010	2336	22	Arretium	50	100
<u>1342</u>	679	3480	80	Pisa	50	100
<u>1690</u>	1096	3032	64	Pisa	50	120
<u>1212</u>	391	3208	88	Pisa	60	150
<u>1213</u>	1180	3070	62	Pisa	60	150

Table 3.4: A summary of the average travelling costs for each of the major potters in Etruria. For a description of the columns, see the caption of table table 3.1 on page 69. The underlining of the potter number indicates the cases where the accumulated travel cost is lower from the production place.

3. Routes of trade and transport

being potter 275, but this was a special case already the first time, as in the first table, 275 was the only potter for whose products the accumulated travel cost was more for the production place than the other place, Pisa.)

Following this line of thought, we could draw the conclusion that – assuming the importance of transport costs in general for the marketing of the items – the model where the transport method has no effect on the costs actually fits better with the demonstrable reality. One implication of this would be that the trade in *terra sigillata* pottery perhaps functioned wholly through land transport.

This implication does have a certain attractiveness. It would suit well with the idea that pottery was mostly traded by itinerant traders travelling from one market to another, and supposedly not in possession of various means of transport but limited perhaps to a wagon.

Based on the two graphs presented above (figures fig. 3.4 on page 68 and fig. 3.7 on page 82), an overall decreasing trend in the transport costs that the items actually suffered is evident in both models. A natural interpretation for this development is provided by the gradual going-out-of-fashion of *terra sigillata*, which is documented also in the figure fig. 1.2 on page 28. The production in the region wanes because the popularity decreases, and the markets are not as strong any more, thus the items are not so wanted in the markets any more either, and it does not pay off to transport them as far as was still profitable in the earlier period. This general trend is supported by all evidence.

There are obvious differences between the results from these two models, too, that we already touched upon earlier when we noted, that the first model seems to describe better a field of practices dominated by transport costs. This conclusion should be tested somewhat further, though, from another point of view. Perhaps the second model actually *is* better in describing what happened? The differences in transport costs from the two large production locations are much smaller according to the second model, except for the late period and the Pisan production, a production evidently aimed for the local markets. Perhaps the second model, with its transport methods, is better after all, as this small difference in the costs would work better together with an idea of a highly competitive market. This interpretation has implications.

One major implication would be that the transport cost itself was not as decisive for the profitability. In the first model, the big differences between the costs actually point towards a market, where the transport dictates everything, as we already concluded earlier; in the second model, the costs suffered are closer to each other, but the production is often in the place, which is the less profitable – perhaps this is because the transport was not as decisive as one might think? The price of the item might be so much better in one place at one time that the transport costs do not matter, the idea, which Laurence sees behind Cato's discussion, and also the explanation given to the logistically bad location of La Graufesenque, as discussed earlier in this chapter.

In the first model, the competitiveness is a result of geography, in the second model, competitiveness would then be a result of the production itself. For me it seems that these two interpretative models are not wholly compatible, and to try to combine them forcefully together would be to skip the important question, whether what mattered in the consumption of these items was the price or the quality. In fact, it may not be possible to answer this question at all. However, I would still like to emphasize the importance of the charting of transport methods done above in bringing forth the fact, that there is no clear and simple evidence to support either of these assumptions; just as there was no obvious support for either of the possible transport practices in the trade, either. We are left in a situation where the observed data fits well the model of transport solely by land, but results in a market which was not too competitive; but the observed data also fits well the model of mixed methods of transport, with the result that the pottery trade seems much more competitive, as the observed transport costs are much closer

together.

In the first case, the actors in the trade would have been multiple and individually small, with relatively separated activity areas. In this interpretation, the traders operated perhaps with small waggons buying the products from the production sites and distributing them further from there. In the second case, the mixed transport of the items and the higher competitiveness of the markets would better be interpreted as a result of bigger actors with overlapping activity areas. An interesting interpretative possibility is opened by the question of change and development – the image presented above is static and does not show any variation over the period of *terra sigillata* production in Etruria. In the next two chapters, these aspects are investigated further.

4

Market mechanisms

Institutions

The usual way to start the kind of a discussion I am about to begin here is with the known words signifying a market place in one form or another: *forum*, *macellum*, and *nundinae*. Also, the traditional way to study these is to address the question through the usage patterns of those words in the works of classical authors, and then try to decipher what the particular context for each word was. Through this decipherment, it is then envisaged that a model can be created where all the market places and institutions have their own, well-defined, and hopefully non-overlapping purposes. There are two major problems with this approach: First, the texts usually refer to the context of the city of Rome itself, the city being the setting for the buying and selling taking place in the satires or the plays of Roman comedy – as Joan M. Frayn notes, ‘It is no coincidence that Plautus and Terence are important sources for the words “market”, because marketing was mainly the domain of slaves and women, who play a larger part in comedy than they do elsewhere in Roman literature.’¹ These texts are then fitted together with what we know of the archaeological remains of market places in Rome, which is actually quite a lot. The problem surfaces when we try to apply this model to other towns of the Roman world, most of which were considerably smaller than Rome, and then we realize that the models are completely unrealistic in the new settings. Another problem is that often the texts are taken as if they were all produced at the same time, and the practices and institutions existed at the same time; this is obviously not so, but when quoting something here, something there, it often is difficult to keep track of the hundreds of years between the quotes.

But luckily, the situation is not so afflicted anymore. For example, Frayn has taken both these problems into account when writing her study on the Fairs and Markets of the Roman Italy² and has been able to provide us with an image of the markets that both varies over time and is sensitive to the different requirements of different contexts at each time.

Based on Frayn’s representation of the development of the retail sale institutions, the main story would be as follows: In the beginning was the *forum*. In a small town, like Rome was in the beginning, and probably very much like all the other towns in the region, everything took place at the central square, the forum, which was also the main market place when markets were there. Already the birth of a market of any kind means a move away from the bare subsistence economies, where one’s needs were filled with one’s own products. In the beginning, the market was not a permanent institution but happened irregularly, thus the word *nundinae*, which means a market taking place every eight days (the Roman word is based on the number nine, but that is

1 Frayn 1993, p. 18.

2 Ibid.

a result of their way of counting periods, same as in calculating the calendar). The forum was the place where the *nundinae* were held every eight days; originally, also the official business, like the assembly meetings, took place on those days, a habit which was reversed later on – the assembly meetings became possible only on days that were *not* market days.³

Varro's explanation of the origins of the institution as a means to regulate the markets so that the rustics (*rustici*) would not have to come to the town more often and could take care of everything that had to be done with only one visit per week fits well this model. But what is very obvious in this model is that the communities were small, and the day-to-day needs were taken care of in some other way. Possibly everyone was supposed to have their own production and to provide for their everyday needs, for example in fresh milk and meat. On the other hand, it could be asked whether the institution of *nundinae* actually is a result of the growth of the centre. John Bintliff claims that there is a cross-cultural catchment radius of a market town (in premodern societies) of ca. 15–20 km, the distance that could be travelled in ca. 3 hours of travel. This in turn is associated with a return trip of one day for a farmer wishing to sell his products on the markets.⁴ With the growth of the towns, the presence of everyday markets would become unfeasible for the more distant farmers and perhaps would have become a limiting factor for supply, discouraging the farmers from travelling to the markets where they could only be present occasionally. A regular *nundinae* market would have been a better solution in this case as it would have meant that the farmers knew which was the day when it definitely payed off to be present.

Later on, with the size of Rome increasing, some additional *fora* came into being. This probably is around the same time that the actual Forum was closed to markets, and they had to be relocated. The *Forum boarium*, for example, specialized in animals and cattle, and everything indicates that these markets preserved their periodicity, as evidenced by the gladiator shows held at the place.⁵ This process was not limited to Rome as evidence of specialized *fora* is not limited there.⁶

But at the same time, the changing social composition of Rome had created needs for permanent food markets. A group of people had developed which could not count on their own resources to provide them with everyday provisions. It became profitable to sell fresh food every day in the towns, and while the early stages of this kind of markets are quite lost to us, the birth of the *macellum* is certainly a result of this social change. It is quite probable that these everyday markets first took place at the usual market places, and with the increasing size of these markets, it was perhaps deemed necessary to construct dedicated buildings for these purposes. These building started to appear at the end of the 2nd c. BCE.⁷

For Rome, this was a historical development already prior to our period, but this change need

3 The eight-day cycle is actually not quite accepted, as the available calendary documents do not exhibit an internal coherence. It has been suggested that at some point of time, the cycle changed to a seven-day cycle, but also this interpretation has its problems. An admirable reconstruction effort is done by Jean Andreau (Andreau 2000) who also summarizes the evidence and demonstrates the problems inherent in it.

4 Bintliff 2002, pp. 216–217.

5 Actually, I'm not sure how well this argument in favour of the continued periodicity holds. It is very easy to see the markets operating only in the mornings, for example, for if the sellers really sold their own products, they could not spend the whole day at the market. In later periods, even in the modern day open square markets, the market is there every day, but closes after midday, so that the farmers get home to prepare their products for the next day. I'm not convinced that an occasional gladiator show on the market square would automatically mean that there were not markets that day. The markets might have been there in the morning, and the show in the afternoon, for example.

6 Frayn 1993, pp. 2–3.

7 *ibid.*, p. 4. One question, which I have not yet seen addressed is, who built the early *macella*? It is very easy to pass the question of agency by using the passive formulation 'It was deemed necessary. . .', but it would certainly be very interesting to know, who were behind these early *macelli*. Who felt the need to improve the marketing conditions of everyday markets? Or was it a question of urban hygiene or social control? Or was it a question of the *matrona* who despised shopping in February hail and icily inquired from her husband whether it really was not possible to have a market square that was covered.

not have happened elsewhere at the same time – and why would it have? If it is the change in the social composition of the population in a town that caused the change from periodic markets catering to the regular but not everyday needs of the populace to a permanent setting for food and other everyday products, other towns of the Roman world faced the change in the market institutions when the respective social change took place in them; this, one might argue, is not a change solely dependent on the time nor is it a change in the general way people related to buying and markets. In short, it is not a cultural change on the level of the regional scale. More likely, we should imagine the different market practices being present in different locations at the same time, without this being contradictory. Whereas in Rome, the social change had created a large urban population with no obvious links to the land nor any productive facilities of their own related to the production of food as a primary product (in opposition to a secondary production, like bread and meals served at bars and restaurants), the ubiquitous rural village or the smaller towns dotting the countryside never – or not yet – had any population of that kind, the people being all, or almost all, farmers working their own farms, and having their own sources to fill the daily dietary needs. In fact, the building of *macella* in Italian towns, which started in the 2nd c. BCE, was a continuing habit, with the latest buildings from 2nd c. CE.⁸

The presence of a *macellum* was often seen as a status symbol for a town. Not every town had one, and to have one built was a boost to the status of a place.⁹ But a *macellum* is not only about status, it tells also about the social structure of a town. The presence of a *macellum* implies everyday demand for food products in the town and the presence of a sizable group of people who made their livelihood in some way that produced money with which they could purchase their daily food from the *macellum*. This may not yet constitute a ‘middle class’ in the later sense, but it definitely is a sign of an urban economy. There is no doubt that once there was a regular market of food operating in the town, also some of those who previously had all the provisions from their own properties would be inclined to use these new markets to procure some of their needs. The *macellum* thus can be seen as a mark of a bigger town: ‘See, we have a *macellum*, we have real urban people!’

The presence of certain amenities was important for a town’s image, as is testified by Pausanias. Pausanias¹⁰ describes the city of Panopeus in the region of Phocis and sarcastically enquires whether one really could call a place that had no public offices, gymnasium, theatre, market square, or fountain a city.¹¹

We need to separate the *nundinae* at this point in two separate categories, more for the sake of the analysis than for any supposed or expected real difference in their actual form in the Roman times. In the light of the discussions above, I find it necessary to study the continuation of the *nundinae*-institution in two main context types: the places with the so-called urban population, for example implied by the existence of stable, everyday food markets in the form of a *macellum*, and *nundinae* in places that were still predominantly ‘rural’ and self-sufficient in the sense of food and daily needs.¹² This is a phenomenon of the period under study for as de Ligt has noted,

8 Ibid., p. 4.

9 Ibid., pp. 7–8.

10 Pausanias was active in the middle of the 2nd c. CE, and he wrote a description of Greece, mostly – it seems – for touristic purposes. In his description he concentrated on the artistic and architectural remains of the glorious Greek past, ignoring most of what originated after 150 BCE. He was a great admirer of Emperor Hadrian’s philhellenic policies. OCD

11 Paus., 10.4: [Σ]τάδια δὲ ἐκ Χαίρωνείας εἴκοσι ἐς Πανοπέας ἐστὶ πόλιν Φοκίων, εἶγε ὀνομάσαι τις πόλιν οἷς γε οὐκ ἀρχεῖα οὐ γυμνάσιον ἐστίν, οὐ θέατρον οὐκ ἀγορὰν ἔχουσιν, οὐκ ὕδωρ κατερχόμενον ἐς κρήνην, ἀλλὰ ἐν στέγαις κοίλαις κατὰ τὰς καλύβας μάλιστα τὰς ἐν τοῖς ὄρεσι, ἐνταῦθα οἰκοῦσιν ἐπὶ χαράδα.

12 As Frayn has noted, ‘[N]ot all the towns which we know from inscriptions to have had *nundinae* also had *macella*[.]’ Frayn 1993, p. 74.

the conceptual difference between *mercatus* and *nundinae* seems to have dwindled in the 2nd c. CE, and *nundinae* assumed the significance of any regularly organized, even daily market.¹³

But before the 2nd c., the periodic markets seem to have flourished and even been an attractive thing to have. In a part where he discusses the relations of towns with large-scale land owners having land in the towns territory – a relation often difficult – Garnsey tells about the north Italian town of Vicetia that was ‘at loggerheads’ with a large landowner, the senator L. Bellicius Sollers, over the latter’s petition to the Roman Senate for a permission to establish a market on his own estate. The town saw this as a threat to its own finances and to the well-being of its inhabitants.¹⁴ Even Claudius as Emperor had to request permission from the Senate, although it is difficult to see, how the Senate could have refused it.¹⁵ The argument between the land-owner Sollers and the neighbouring town about Sollers’ intention to set up a new, periodic market on his own properties is crucial evidence of the importance of these markets, at least in the rural contexts, in Plinius the Younger’s time; the letters are dated to 105 CE. The case of Sollers, and other evidence of these so-called ‘domanial markets’ is collected and analyzed by de Ligt.¹⁶

One explanation for the continued flourishing of the *nundinae* could be that they were perhaps more specialized in products that did not need to be traded every day. Those were the products that might be needed in everyday life by most people but whose purchase did not need to take place everyday and could be postponed until the occasion for their purchase became available. Obvious examples of these kind of items are of course cloth and clothing, tools and utensils, pottery etc., but also various forms of foodstuff, for example oil, flour, wine, *garum*, and other regularly used items that did preserve well and could be bought only occasionally and in larger quantities. For all these items, a *nundinae* might be a natural market place as its periodicity would solve problems of scale for both the seller and the purchaser: the seller needs to have a certain customer base to be able to survive on the sales, and selling the products at various *nundinae* would increase the customer base considerably. On the other hand, for the purchaser, the catchment area of the local town might be able to support one specialized trader in a product type, but the periodic market might attract more of these traders specialized in these products and thus create competition while ensuring better relation between the price and quality.

The different market institutions thus respond to different temporal levels of needs. In addition to the daily and regular needs, there is yet another temporal level of needs, consisting of occasional needs. If you live in a town without any land of your own, your daily needs might be filled by the *macellum*, with additional products from the *nundinae*. For the regular but not daily purchases, the *nundinae* might be the place to go, both for the city-dweller as for the *rustici* coming to town not only to buy but also perhaps to sell. The third level of market institutions of which there is evidence is the fairs, i.e. periodic markets with long periods taking place perhaps once a year, often in combination with a festival¹⁷. These fairs would provide the occasion to fill the occasional needs, which might be expensive, long planned purchases for the farm or the house, like animals, or luxury items for conspicuous consumption – a habit, which should not be limited to the upper classes.

In reality, this model is probably more muddy, as Ligt has shown. He cites as an example a passage from Tertullian, writing around 200 CE in defence of the local Christians in North

13 Ligt 1993, pp. 51–52.

14 Garnsey 2000, p. 696. Plin. ep., 5.4: *vir praetorius Sollers a senatu petit, ut sibi instituere nundinas in agris suis permetteretur.*

15 Suet. Claud., p. 12.2: *ius nundinarum in privata praedia petit.*

16 Ligt 1993, pp. 156–161, 167 sqq.

17 Often probably religious, but I’m not sure whether it is possible nor even worthwhile to make any distinction between ‘religious’ and ‘secular’ festivals in the Roman world. Fairs in connection with religious festivals were common in the Eastern part of the Empire, see *ibid.*, pp. 65–75.

Africa. They were charged with social uselessness because they do not attend the religious festivals and pagan theatrical shows and thus do harm to the local vendors. Tertullian defends the Christians by stating that ‘We do not attend the shows. However, if I wish to have such goods as are usually sold at those gatherings, I can obtain them in more abundance from their respective places.’¹⁸¹⁹ Ligt’s interpretation of this passage and its context brings out a surprising competition between two modes of trade, as he sees in Tertullian’s sentence a confirmation of the existence of alternative sources for the goods. The presence of the items at the fairs connected to the festivals is obvious, but, according to Ligt, Tertullian by this statement confirms the existence of also other vendors for the same goods, vendors which can be used without taking part in the pagan festivities. These were the regular markets, *nundinae*, and even permanent shops. Ligt connects this overlap of markets with the *larger* cities in Africa, like Carthage where Tertullian was writing, whose population ‘appears to have been in the habit of making certain purchases (the larger ones?) at festival-connected markets rather than in permanent shops or at weekly markets.’²⁰ This would of course be explained by just the size of the town, as it could have been only the larger towns that also had the capacity of maintaining *nundinae* and in some cases even permanent shops; and it is just this kind of a permanent shop that was used to make and sell pottery in Puteoli.²¹

In fact, the most serious competitor for *nundinae* as the place for pottery trade are the small *tabernae*, workshop cum shop, where the items sold were also made on site. As *terra sigillata italica*, as far as is known, was made in the suburban workshops of Arretium and Pisa, it is not likely that these *tabernae* are even an option when considering the marketing of *terra sigillata* pottery; those *tabernae* that only sold products but not made them themselves could of course sell *terra sigillata* pottery, too, but in this case, these shops probably acquired the items through the same channels as they moved around anyway. The word *taberna* itself most often means drinking-shop but is often used with qualifications to turn it into some other function. Frayn is of the opinion that the *taberna* originally meant just the room or a space of a certain physical characteristics and not the functions in that room.²²

Whether the place where *terra sigillata* items were sold was a *taberna* or at the periodic *nundinae*, they both can be found in towns; the petition of Sollers above is an isolated incident, and there is very little evidence of any markets in rural areas in Italy – the evidence of these collected by Nolle comes from Africa and the province of Asia.²³ In the next sections I’ll be asking, who were the traders that operated between these urban market centres and whether there was any internal organization to their working. At first, a look at itinerant traders.

Itinerant trading

In the chapter on trade in the second edition of the *Cambridge Ancient History* vol XII, about the period 70 to 192 CE (‘High Empire’), William Harris also addresses the question of the personnel active in the trade²⁴. Tellingly, he starts with *negotiator* and *mercator* and continues by associating these exclusively with sea-borne trade (‘He might, for instance, travel with his own goods on a

18 Ibid., p. 63.

19 *Spectaculis non convenimus; quae tamen apud illos coetus venditantur si desideravero, liberius de propriis locis sumam.* Tert. *Apol.*, p. 42.7

20 Ligt 1993, p. 63.

21 ILS, 7661: *M. Modius M. l. Pamphilus | figulus propulus. | Modia M. l. Dóris. | M. Modius M. l. Telesphorus.* where *figulus propulus* is the term meaning a stationary pottery producer and vendor. Frayn 1993, p. 58.

22 Ibid., p. 6.

23 Nollé 1982.

24 Harris 2000, pp. 731–734.

ship owned by another, or send a subordinate, normally a slave or freedman, in charge of the consignment. Alternatively, he might own and captain a ship himself.’) Then he discusses the status of these actors and the various theories of the upper class involvement in the trade through proxy traders. In the end, he notes that

[i]n addition to those who carried on long-distance trade, there were, of course, men and women, probably far more numerous, who bought and sold commodities between one community and another on a relatively small scale, such as the men who are recorded in the papyri as dealing in small quantities of textile goods.²⁵

In the same vein, Claude Nicolet dealt with the late republican period: In his discussion, trade is always large scale and maritime, and the companies (*societas*) are formed by wealthy, upper class men; other forms of trade barely appear in the text.²⁶

But undoubtedly there existed another kind of trade, too. One way to commercialize products of a farm was to sell them to itinerant traders who came to the villa looking for products. This kind of practice is implied also by Cato who advised the aspiring farm owner to be a good neighbour in order to, for among other reasons, better sell the products of the farm.²⁷ There evidently was a class of people who toured around the countryside in search of products and then sold them later on. Whether Varro had these in mind when he commented that if the land was situated by a road a tavern might be built is questionable: Varro uses this as an example of a profitable thing that could be done with land that still is not agriculture and were comparable to quarries.²⁸ A combination of itinerant and centralized trade can be found in the somewhat analogous situation of the 19th century garment trade in France, where the merchants ‘either sold [the garments] in large markets or sent salesmen off with them to markets and fairs.’²⁹ These kind of trading practices were also surprisingly durable: Strabo tells of the town of *Fregellae* where also after the destruction of the town in 125 AD the inhabitants of small towns and villages gathered for markets and religious ceremonies.³⁰

There is some evidence that the old Etruscan system was much more centralized than what resulted from the Roman rule. According to Ward-Perkins, there was a ‘rapid spread of an economy based on a loose distribution of open farmsteads instead of the more compact hierarchical system of the Etruscan city states.’³¹ In a comparative study of the regional black glaze from the Volterranean area and the Tiber Valley project zone, Helga Di Giuseppe has discovered a change in the marketing practices of black glaze. In general, it seems that while in the 3rd century BCE the local production dominated the markets in Southern Etruria, from the 2nd century onwards the Roman area and Latium seem to open up to imports from other regions of Italy. The products of Volterrae and Arretium reached the Middle Tiber Valley area.³² This is a fact I have hinted at also earlier, but it can be brought up also at this point to support the interpretation that there was a change from the more centralized and hierarchical economic system of the Etruscan to a

25 Harris 2000.

26 Nicolet 1994.

27 Cato, *Agr.*, 4: *Si te libenter vicinitas videbit, facilius tuas vendas, opera facilius locabis, operarios facilius conduces; si aedificabis, operis, iumentis, materie adiuvabunt: siquid bona salute usus venerit, benigne defendent.* In addition to selling one’s products, good relations also help in renting work-force in and out, getting aided when building, and otherwise being helped in situations of need.

28 Varro, *Rust.*, 1.2.23.

29 Scott 1999, p. 98.

30 Strabo, 5.3.10: Φρεγγέλλαι . . . ὅν μὲν κώμη, πόλις δὲ ποτε γεγοῦσα ἀξιόλογος καὶ τὰς πολλὰς τῶν ἄστυ λεχθεισῶν περιοικίδας πρότερον ἐσχηκυῖα (αἱ νῦν ἔτι εἰς αὐτὴν συνέρχονται ἀγοράς τε ποιούμεναι καὶ ἱεροποιίας τινάς).

31 Ward-Perkins 1962, p. 397.

32 Di Giuseppe 2005, p. 46.

more open, heterogeneous system of the Roman rule. As a result, for example, in the areas closer to Rome, as in the territory of Veii and Lucus Feroniae, the countryside was also settled with small farmers. In the more remote areas, like Ager Faliscus, the old, village based economy and the preexisting large estates seem to have continued also in the Roman times.³³

The openness and the heterogeneity of the new, Roman system has now been extensively hinted at; in the next section the data is analyzed from this perspective.

Complexity of practices, or, analysing the stamps compositions

The point in this section is to analyze the *terra sigillata* data from OCK² database from the point of view of internal cohesion. The aim is to see, whether the data exhibits the kind of internal structuring that would point to a hierarchical organization of the marketing practices. The method used is Principal Components Analysis (PCA) that is a form of simplification of a complex data set. PCA summarizes the data so that as much as possible of the internal variation in the data set can be explained with as few variables as possible. In the case of the *terra sigillata* data set, the logic of this method is based on the assumption that if the marketing and trade of *terra sigillata* are centrally organized it will result in a data set that is more internally cohesive than the data set produced with markets that are not organized. Since the size of the data set affects the measure of cohesion – variance – of the data, and the size of the data set formed by the *terra sigillata* in this study varies over time, the results cannot simply be deduced from the variables found by PCA; the analysis must be based on other features of the data, namely: the dissonance of the total data set and the PCA variables; and the changing relations between the variables produced with PCA. The emphasis of this section is on time and temporal development, and even though a single picture, or a single PCA of the data set at a certain point of time, does not provide any decent grounds for arguments, a series of these pictures will bring forth a development of the internal formation processes of the data – the marketing practices in the region.

The format of this section is somewhat unusual, as within the text, it also contains the program code written for the R statistical package.³⁴ The scripts shown below are all run in one session of that system. In practice, this chapter describes both the R program written during the analysis and the reasons why the analysis was performed as it was.³⁵

Setup of the system

At first, our program needs to connect to the necessary program libraries for connecting to the database and performing the analysis.

```
library ("RODBC")
library ("cluster"); library ("ade4")
library ("ascii"); options (asciiType="org")
```

33 Ward-Perkins 1957, pp. 398–9.

34 R Development Core Team 2009. The *R Statistical Package* is a programming environment for different kinds of statistical computing and graphics. Programs written for it use the *R Programming Language* and can be made to perform various analyses using some of the hundreds of additional program libraries written for it.

35 The reader may be put off by the amount of computer code in this section, and I'm well aware that that is not a traditional part of historical writing. As a guide to reading these pieces, there is some easy advice: 1. Parenthesis means grouping together; 2. Arrow means movement of something from one place to another, i.e. $a \leftarrow "b"$ means that a will contain the value 'b'; and 3. words that sound English usually mean approximately the same thing as what the words also mean in common usage.

4. Market mechanisms

The library *RODBC*³⁶ is used for accessing databases. This module uses Open Database Connectivity (ODBC) to access the PostgreSQL server which contains the actual data that was obtained from OCK². The library *cluster*³⁷ will be used for cluster analysis. It contains the necessary modules for basic cluster analysis, and it is complemented with some algorithms for distances between binary variables from the library *ade4*³⁸. And in the end, the program library *ascii*³⁹ is used for exporting table and list format data from R, in the cases the default R format is not useable as it is.

As the last part of the system setup, a connection to the database with the *terra sigillata* data is defined. *TS* is the name of the database on the local PostgreSQL server: `TSchannel <- odbcConnect("TS")`

Collecting and sorting the data

A few empty containers are needed for data. *potters* is meant to contain numerical references to individual potters in the database, and *sites* is to contain a list of the recovery locations for the items.

```
potters <- list()
sites <- list()
```

Next we collect the individual findspots from the database. First, a database query string is constructed in the SQL language to select from the table *etruria.findspots_in_etruria* the name of each site and its geographical coordinates, alphabetically ordered by the find location name. This query is run and the resulting table is stored in *sites*; the results are also shown in Table 4.1.

```
sitesQuery <- paste("select findspot , latitude :: numeric , longitude :: numeric from etruria .
    findspots_in_etruria_order_by_findspot")
sites <- sqlQuery(TSchannel , sitesQuery)
```

Table 4.1: Findspots and their geographical locations in Etruria.

Findspot	Latitude (°N)	Longitude (°E)
Alberoro	43.33	11.8
Arezzo	43.47	11.88
Bientina	43.72	10.62
Bolsena	42.64	11.99
Brolio	43.4	11.45
Capena	42.14	12.56
Capodimonte (VT)	42.55	11.91
Castel d'Asso	42.39	12.02
Castelluccio	43.05	11.78
Castiglione/Teverina	42.63	12.22
Castiglion Fiorent.	43.33	11.92
Certaldo	43.55	11.05
Cerveteri	41.98	12.1

36 Ripley, and Oct 2002 Michael Lapsley 2009.

37 Maechler et al. 2005.

38 Dray and Dufour 2007.

39 Hajage 2010.

Findspot	Latitude (°N)	Longitude (°E)
Chiusi	43.03	11.95
Coltano	43.65	10.4
Cortona	43.28	11.98
Cosa	42.42	11.28
Ferento	42.49	12.14
Fiesole	43.8	11.28
Firenze	43.78	11.25
Isola di Migliarino	43.75	10.33
Livorno	43.55	10.3
Lucca	43.83	10.5
Luni	44.03	10.05
Marciano d. Chiana	43.3	11.78
Montefiascone	42.53	12.05
Montepulciano	43.08	11.77
Monte Romano	42.27	11.9
Nepi	42.23	12.35
Orvieto	42.72	12.1
Perugia	43.12	12.38
Pietrasanta	43.95	10.23
Pisa	43.72	10.4
Pistoia	43.93	10.92
Pitigliano	42.63	11.67
Pitigliano/Saturnia	42.63	11.67
Poggio Murella	42.65	11.5
Rignano Flaminio	42.22	12.48
Roselle	42.82	11.16
San Lorenzo Nuovo	42.68	11.9
Sarteano	42.98	11.87
Saturnia	42.65	11.5
Settefinestre	42.44	11.36
Siena	43.32	11.32
Sutri	42.23	12.23
Tarquinia	42.25	11.77
Torrita di Siena	43.15	11.77
Vasanello	42.4	12.38
Veii	42.03	12.4
Vetulonia	42.87	11.02
Viterbo	42.4	12.1
Vitiano	43.37	11.89
Volterra	43.4	10.87
Vulci	42.38	11.63

Next, we create a simple list of periods (in the terminology of R, a vector of values). The values of the vector mark the start and end points of the time periods into which the data is divided. In the resulting data, the periods will therefore be one less than the values in this vector. The following code thus creates the numbers from -40 to 150 with a step of 10 and stores them in

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periods10y.

```
periods10y <- seq(from=-40,to=150,by=10)
```

In addition to the numerical limits of the periods, we will need the period names in the same form that they appear in our database. The following function will turn a numerical limit of the form -40 to a textual presentation of the form 'per-40'. These are stored in *periodName*.

```
periodName <- function(prn) {  
  paste("per",prn,sep="")  
}
```

Next, we need the function that collects the data from the database.

```
getData <- function (periodSequence) {  
  data <- list ()  
  # The main loop, runs once for each period given  
  for (prn in (seq(1,length(periodSequence)-1))) {  
    pr <- periodName(periodSequence[prn])  
    # Get all potters active during current period  
    pquery <-  
    paste("select_potter_no_from_oma.site_cluster_potters_where_min_date<=",  
          periodSequence[prn+1]  
          "and_max_date">  
          periodSequence[prn]  
          sep="")  
    potters[[pr]] <- sqlQuery(TSchannel,pquery)  
    findspotQuery <-  
    paste("select_findspot_from_oma.potter_sites_etruria ("  
          potters[[pr]][[1]]  
          ") "  
          sep="")  
    data[[pr]] <-  
    data.frame(sqlQuery(TSchannel,findspotQuery),row.names=1)  
    # The potter loop, for each potter collects the  
    # amounts  
    # at all findspots  
    for (potter in potters[[pr]][["potter_no"]]) {  
      # When more than 1 items, return 1, when 0,  
      return 0  
      potterQString <-  
      paste("select_findspot ,case_when_amount>0_then_1_when_amount=0_then_0_end_as_p"  
            potter  
            "_from_oma.potter_sites_etruria(",potter,") "  
            sep="")  
      c <- data.frame(sqlQuery(TSchannel  
                             potterQString  
                             stringsAsFactors=FALSE))  
      data[[pr]] <- data.frame(data[[pr]],c[2])  
    } # Repeat the loop for each potter  
  } # Repeat the loop for each period  
  return(data)  
}
```


This function takes as its argument a sequence of periods that was defined above. For each of these periods, it constructs a list of potter stamps that are present in the materials from that period. For each of these stamps, it then collects a list of all findspots, or sites, in the study region and, for each of these sites, marks the presence of the stamp by number 1 and the absence of any products with this stamp by 0.

As a result, we have a three-dimensional data matrix where, for each period defined, there is a two-dimensional array, each row representing one location during the period and each column marking a stamp type that appears somewhere in the study area during this period. Each value in this findspot–stamp–matrix then marks the absence or presence of the stamp at the findspot during the period. Each stamp type in this case is a variable, and the locations are measurements. Each location represents a measurement of the stamp composition at that location, and the composition is formed of presence/absence variables, each stamp type being one.

In the end, the function defined above is run, with the periods defined earlier given as an argument.

```
data10y <- getData(periods10y)
```

The variable `data10y` now has the necessary data, divided in 10-year periods.

Principal components analysis

I will start the analysis by exploring the development of complexity within the data. As a tool, I use a method called PCA, which is a general method of simplifying multidimensional, or multivariate, data. It is based on the idea of representing the original variables of the data in terms of other, originally unknown variables. These unknowns are selected so that they will try to explain as much of the variability in the original data as possible with as few variables as possible.⁴⁰

In the case of our data, it is hard to say what would these ‘unknown variables’ signify. However, in this case their actual *meaning* is less important than the explanatory power these variables have, and especially, how this power develops over time.

At first, we need a function with which to get an idea of the principal components of the data. In the first case, I will show the variances for the principal components of certain period in the data. The function defined below will loop through the data with the periods given and, for each period, plot out a figure visualizing graphically the relative importances of the principal components present in the data.

```
prAnal <- function(periodSequence, datalist) {
  # The main loop over the periods
  for (prn in (seq(1,length(periodSequence)-1))) {
    pr <- periodName(periodSequence[prn])
    # Plot the figure for each period
    plot(prcomp(as.matrix(datalist[[pr]]))
         main=paste("Period",pr,sep="_")
         ylim=c(0,5))
  }
  dev.off()
}
```

The function defined is run with the periods defined above and with the data collected from the database.

⁴⁰ A good explanation of the method and its mathematics can be found, for example, in chapter 9 of Härdle and Simar 2007.

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```
data10yPrinComp ← prAnal( periods10y , data10y )
```

This results in 19 different plots, one plot for each ten year period. Some of these are summarized below before moving on to a better summary of the principal component.

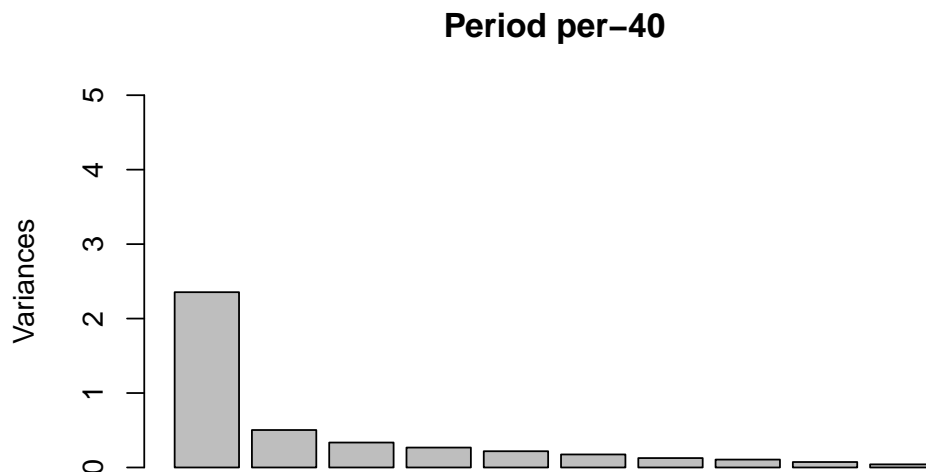


Figure 4.1: The Principal Components for the period 40 to 30 BCE

In the first plot, in figure fig. 4.1 on this page, there is a graph depicting the variances for the 10 first principal components of the data from the period 40 to 30 BCE. The variance covered by the first component only is almost 2.5 whereas the second component has a value slightly less than 0.5. This means that there is one variable, or factor, that is approximately five times more important than any other factor in explaining the change within the data. What this factor is, is not so easy to decipher; I will come to that later.

The next plot, in figure fig. 4.2 on the next page, shows a graph like the previous one but for a different period. This time, the first component has a variance value of over 3 whereas the second component is just below 1; even though this time the difference seems larger, the first component is only three times the second one. One is made to think that the absolute variance amount in itself might not be enough to explain anything, as in the second case the absolute numbers are much larger than in the first case.

This interpretation is confirmed by the third plot in figure fig. 4.3 on page 101 for a still yet later period. In this case, the first component has a value of less than one, with the second component over half of the size of the first one. In this case, the variance has in general smaller values than the previous two cases.

This development can also be summarized in a more readable form, both as a table and a figure. In these is shown the development over time of the variance in the data and the portion of this variance explained by the first two principal components. In the table table 4.2 on page 100 each

Period per-30

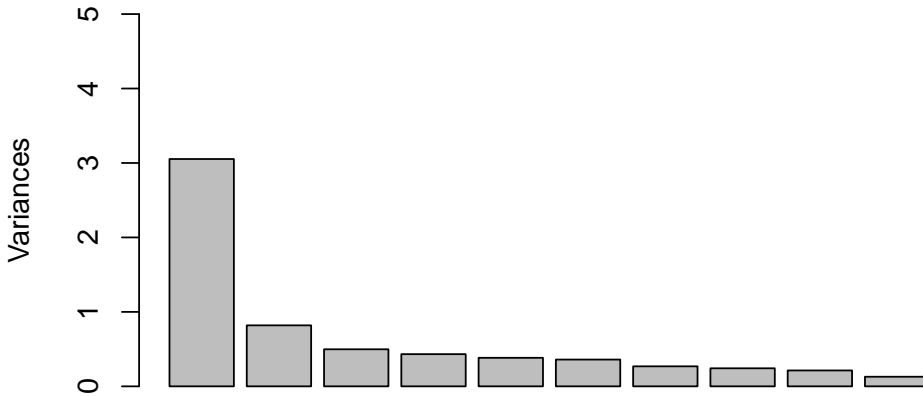


Figure 4.2: The Principal Components for the period 30 to 20 BCE

horizontal row is a period, starting from the year of the row and ending before the year of the next row (i.e. *per-40* is the period '40 to 31 BCE '). The second column, *PC1*, shows the variance values of the first principal component of the data for each period, and the third column *PC1 (%)* shows the percentage of the total variance in the data explained by this component. The total variance is shown in the last column *Total variance*. The columns four and five, *PC2* and *PC2 (%)*, show the corresponding values for the second principal component. The sixth column, *PC1+PC2 (%)*, shows the percentage of the total variance explained by these two components together.

The interpretation of the table begins from the rightmost column, *Total variance*. It starts with the value of 4.456, rising to over 10 during the next 20 years and staying at that level for the next 30 years. After that, it slowly begins to decrease, and the gradual, steady descent goes on until the last period when it is already very close to zero. A simple interpretation is that in the beginning, the markets grew rapidly, and there is a large variance as many of the findspots do not have any finds from this period whereas others have them in abundance. The variance continues to grow as the nascent trend invites more producers and traders to the business, and the variation between different sites gets bigger and bigger: more items from more producers result in bigger variations in find compositions between different localities. The descent begins rapidly, and between years 1 and 30 BCE the variance is halved. After that, the situation stays relatively stable until ca. 100 CE when there is another drop in the variance. Until the end of the study period, the variance in the data stays small, reflecting the small amount of active potters. The development of the total variance, as well as the individual values for the first and second principal component, is shown in a graphical form in figure fig. 4.4 on page 102.

The narrative gets more nuanced with the introduction of the difference between the first and

Table 4.2: The variance explained by the first and the second principal component of the data. First is the absolute variance explained by the component, then the relative amount of this variance from the total variance of the data for each period. The column 'PC1+PC2 relative' shows the percentage of the variance explained by these two components together.

	PC1	PC1 (%)	PC2	PC2 (%)	PC1+PC2 (%)	Total variance
per-40	2.354	53	0.503	11	64	4.456
per-30	3.053	43	0.819	12	55	7.032
per-20	4.529	40	1.316	12	52	11.222
per-10	4.111	39	1.207	11	51	10.52
per0	3.751	37	1.299	13	49	10.254
per10	2.818	35	1.015	13	48	8.037
per20	1.922	35	0.657	12	47	5.512
per30	1.604	36	0.523	12	48	4.448
per40	1.303	31	0.662	16	48	4.137
per50	0.957	31	0.621	20	51	3.064
per60	0.881	31	0.618	21	52	2.885
per70	0.699	26	0.639	24	49	2.708
per80	0.61	31	0.49	25	55	1.991
per90	0.656	31	0.491	23	54	2.131
per100	0.439	50	0.11	12	62	0.885
per110	0.445	48	0.111	12	60	0.921
per120	0.303	42	0.102	14	56	0.726
per130	0.303	42	0.102	14	56	0.726
per140	0.297	43	0.101	15	58	0.689

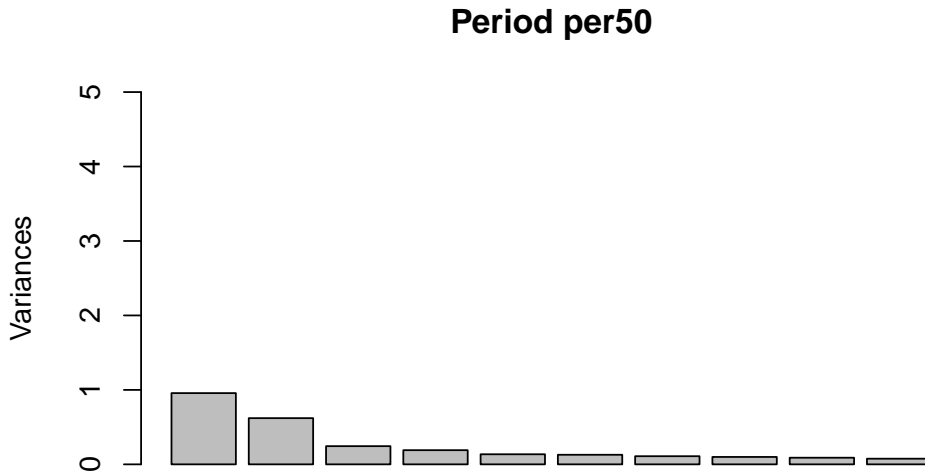


Figure 4.3: The Principal Components for the period 50 to 60 CE

second principal component in the analysis. In the growth period between 40 and 20 BCE, the first component decreases in explanatory power while its relative share of the variance diminishes from 53% to 43% while at the same time it doubles in absolute numbers. This development suits well the image of a rapidly expanding market where the original producers/marketers, while losing their relative share of the markets, still manage to increase their production and sales. At the same time, the huge increase in the total variance points to a rapid expansion of the markets in general. The stable proportion of the variance covered by the second principal component supports the interpretation that the new competition was not in the form of a single, well-organized actor but from numerous new actors in the markets. This is also supported by the decreasing proportion of the total variance covered by the two principal components from 64% to 52%.

To sum up the development of the first decades, the markets of *terra sigillata* were expanding rapidly and became in the process heterogeneous, with many competing actors. The period between 20 BCE and 20 CE seems relatively stable; this is the peak period of *terra sigillata* production and consumption in the region, and the high level of variance corresponds well with that. The gradual descent of the curve, however, points to a gradual consolidation of the markets. They were slowly regularizing but without any drastic changes. What is to be noted, though, is that the gradual descent of the total variance is accompanied by quite as steady descent of the first principal component, both in absolute value and in relative importance. A major part of the descent in total variance is explained by the decrease in the first principal component, which leads to the conclusion that whatever was the driving force behind the trends of *terra sigillata* in Etruria, it certainly began to lose its importance at this time.

The period between 30 and 90/100 CE sees a continued but gradual deterioration of the

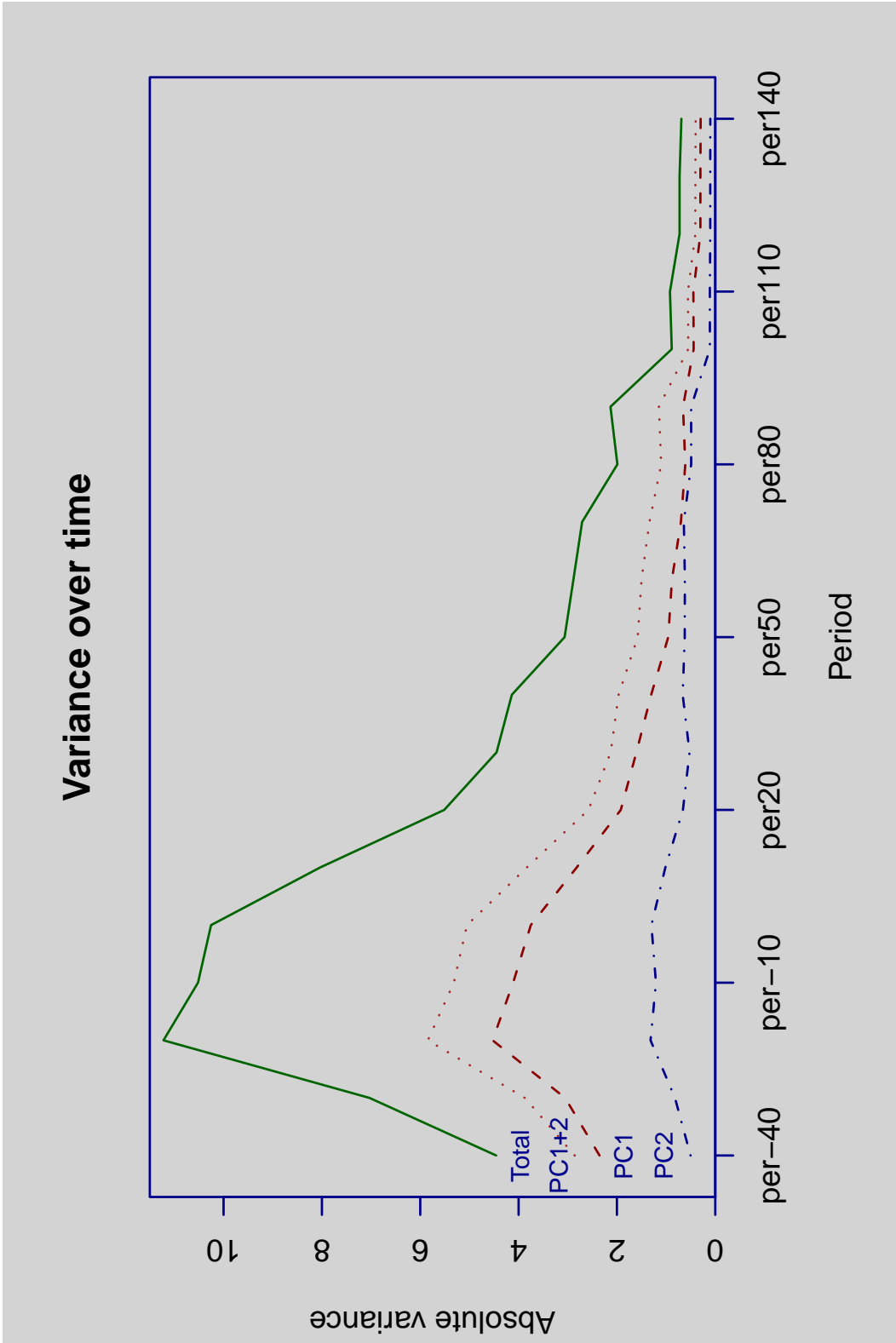


Figure 4.4: Variance over time

markets where the importance of this complex of actors manifest in the first principal component has its importance around 30%; notable is the rise of the importance of the *second* principal component to the extent that at the end of this period, it is very close in explanatory force to the first principal component. An obvious solution is the further dissociation of the localities from each other, and perhaps also the lessened importance of *terra sigillata* in the region.

But something seems to happen around the year 100 CE when the total variance drops, and the first principal component suddenly jumps up in importance to cover one half of the total variance in the data; at the same time, the second component loses over half of its importance, and suddenly, we're back in the situation of the beginning, with one set of factors defining most of the markets.

We can for example compare this development of the variance with the figure showing the general development of the *terra sigillata* trade in fig. 1.2 on page 28. These figures, while both obviously telling the same general story, differ markedly in some interesting points; for example, the overall trade seems to reach its peak around 10 BCE, and a strong decline starts around 10 CE; the variance, on the other hand, seems to reach its peak already around 1 CE, and while the overall trend reaches its biggest numbers, the variance is already on a slow decline. What this would mean is that even though the markets are still growing, the differences between different places are getting smaller, the consumption patterns are homogenizing, and it may actually be that the actors in the market are getting bigger and the spread of their products is getting more stable.

Now, the problem in this comparison is that the fig. 1.2 on page 28 is based on the complete data in the OCK², whereas the variance figure is only for the area of Etruria. In order to see the development of the variance figures in relation to the local development of *terra sigillata* trade in general, see figure fig. 4.5 on the next page.

What becomes evident from this figure is the fact that variance and the total amount follow almost exactly the same curve, which is to be expected because of the way variance in the data is calculated: the more samples there are, the bigger will in general be the variance in the data. As a result of this, the interesting things are located at the points where the variance curves and the total amount curve move in *opposite* directions, as happens for example between 20 and 10 BCE. Above we concluded that the behaviour of the first two principal components at this period point towards a consolidation of the markets where the differences between different locations seem to decrease somewhat. When compared to the development in total amounts, this image becomes even stronger: Even while the total amount of items in the markets is increasing, the variance is already decreasing.

What this means in practice is that when the *terra sigillata* market was reaching its biggest volumes around 10 BCE in Etruria, the local variations in consumption patterns of *terra sigillata* were already getting smaller. This indicates a consolidation of the trading patterns. There are two possible implications, which need not be mutually exclusive, i.e. they both can have taken place.

The first implication is that the number of actors in the trade has diminished, and consequently, the volumes one actor dealt in increased. Without any further evidence it is impossible to say whether these larger actors were individuals or companies. Partnerships of merchants were quite common, and the *societas* thus formed had received detailed attention from the jurists. The society could be of determinate or indeterminate duration, and *servi communi* could be used. A natural way for a larger society would be to use slaves, freedmen and *institores*.⁴¹ The nature of the Roman law on societies of all kinds explains why these kind of societies would not be visible in the sources, even if they existed: a private company with shared profits and responsibilities did

41 Harris 2000, p. 735.

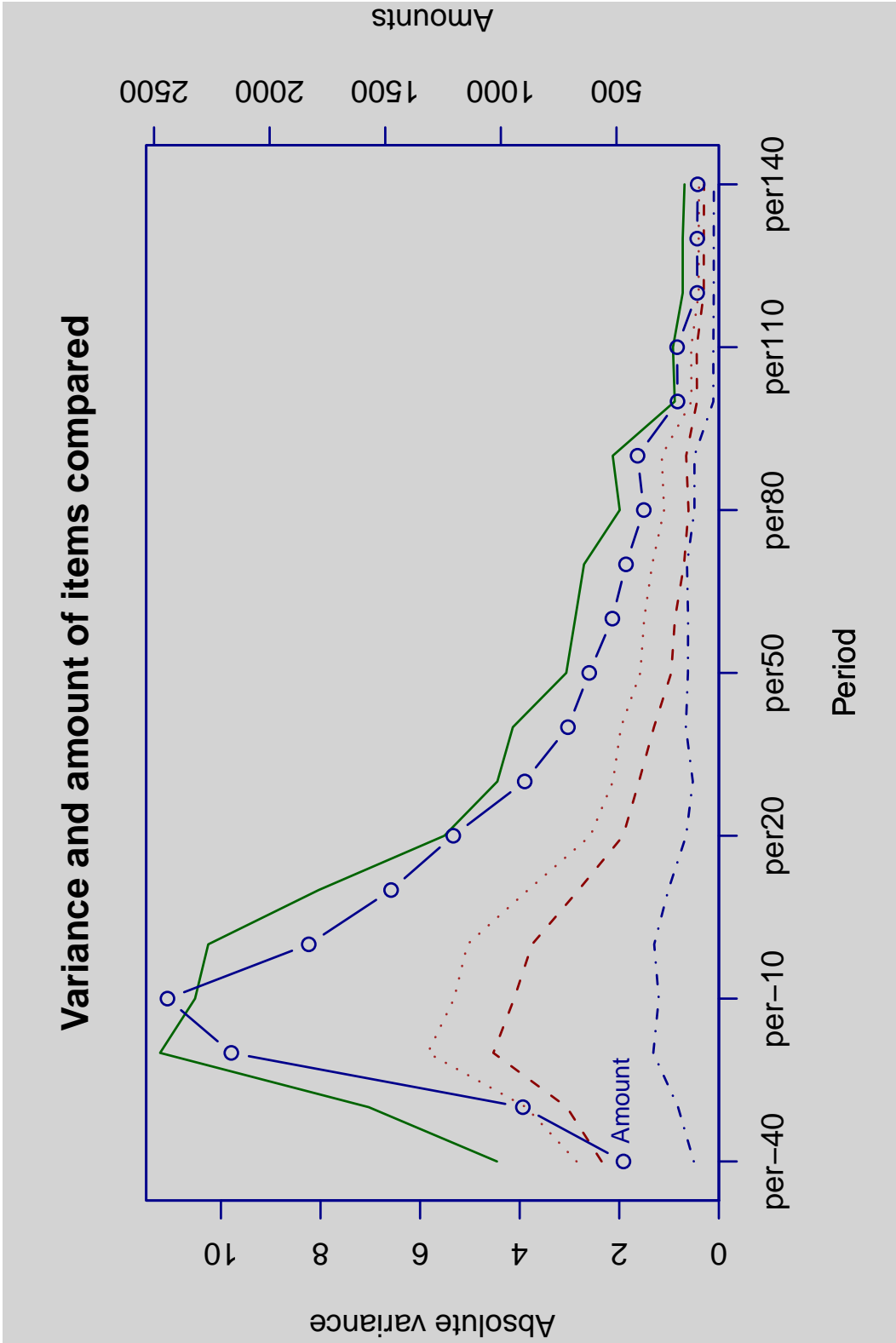


Figure 4.5: Amounts of *terra sigillata* in Etruria during the study period plotted against the variance curves from figure 4.4.

not form a legal entity that could appear independently of its owners.⁴² Therefore, even if a 'pact' or a company existed between two or more individuals, they would still appear as individuals in the sources.

The second implication is that the activity patterns of individual traders have become more alike. This would indicate a certain kind of internal organization of the trade, for example in some kind of *collegia*. This would not be an unheard of development. For example, the *Piazzale delle corporazioni* in Ostia demonstrates the existence of some kind of geographically defined trader's groups, as also do the inscriptions from Gallia that demonstrate the existence of groups of sailors on the rivers.⁴³

What I would like to suggest based on this argumentation is that the marketing of *terra sigillata* within the Roman Etruria underwent some kind of a consolidation process immediately before and during the widest expansion of the markets. The originally more varied distribution patterns seem to gain in unity in a matter that is suggestive of increased co-ordination of the practices. Based on the available evidence, it cannot be said what would have been the form this consolidation of the markets actually took. Comparison with evidence in other areas does point to the existence of some kind of organizations bringing together people working in a similar trade or traders coming from similar origins, but evidence for anything like this has not to my knowledge been discovered in the case of the Roman period in Etruria.

But thus far the evidence is far from conclusive. In the next chapter, the problem is approached using other methods. This time, it is asked, whether the data shows any *regional* cohesion which would point towards institutional organization of traders operating in areas encompassing multiple towns and their territories.

42 Taubenschlag 1932, p. 73.

43 Schlippschuh 1974, pp. 109–.

5

Market zones and patterns of consumption

In this chapter, I'm taking a slightly different view on the distributions. In the previous chapters, the emphasis was on the routes and their possible effects on the distributions and on the quantities of items transported. We analysed the material thus from the viewpoint of the production and then from the point of distribution. In this chapter, I want to take a different kind of a view on the data, starting with the idea of local market zones. In the previous chapter, we looked at the matter from the viewpoint of logistical thinking: 'Starting from this point, where should I take my stuff?' Now, I want to look at the matter from the other end of the chain – from the markets: looking at *terra sigillata* locally, I'm interested to know, where they came from, and whose items they were? I'm also asking, how homogeneous a region Etruria actually was, in respect to *terra sigillata* consumption. I approach this question by investigating whether there were areas within the region that had their own consumption patterns; such as whether in some areas the products of some potters were more favoured when in some other areas the emphasis was on the items from some other producers. The way to approach these questions is, once again, with quantitative analysis of the same *terra sigillata* corpus that has so profitably been used in the previous chapters.

Demand and consumption

How to assess whether an area or region was similar in its 'consumption patterns'? First we must begin by asking what constitutes a 'consumption pattern'. In the context of this chapter, consumption pattern in general is understood as a spatially and temporally defined collection of items and services the people bought and used. For example, the Arretine *terra sigillata* consumption pattern would mean all the kinds of *terra sigillata* that were marketed and bought in Arretium. This would be particular to just Arretium in comparison to other places like Florentia or Clusium that would have their own consumption patterns. The purpose of this chapter is to analyse the differences in *terra sigillata* consumption patterns between the different localities and areas forming the Etrurian region and to explicate these differences over time.

But why study consumption if the main question of the work is on the production and marketing? For the simple reason that main source of this study – the collection of *terra sigillata* pottery in OCK² – is a result of consumption. The items we have in the collection are mostly discarded items that had already passed through the whole chain of production and marketing and had already 'been consumed'. On the other hand, I do call into question the old maxim of supply and demand, the idea that production and markets rose to meet the demand. My view of the whole process starts from the other end of the chain, from the producers and marketers, and I do claim that it is the supply that creates the demand, not the other way around. This is so for

the simple reason that people hardly can want to buy some things they do not even know exist: How can there be demand for something no one knows exists?

The claim that supply creates demand and not *vice versa* is actually not new. A similar claim is known as ‘Say’s Law’ after the French economist Jean-Baptiste Say (1767–1832), who first formulated something along the lines in his *A Treatise on Political Economy*. However, Say’s formulation of the demand-producing quality of increasing supply is not quite what I mean here as it is still focused on the producer: the supply of *his* product which will be sold created a demand for other items the *producer* will purchase with the money he received from his products; and the gist of Say’s argument is that the producer *will* purchase, as soon as possible, as money is not a stable keeper of value. Therefore, the producer will want to get rid of the money as soon as possible as it is of no *inherent* value and exchange it to something which does have value, be it raw materials, other peoples’s products, or property.¹

This ‘Say’s Law’ could in general be interesting to use in the context of Roman economy studies; the demand-creating nature of supply used in this work is of a different kind and starts from the need-creating or niche-filling potential present in every product. To put it more concretely, the red *terra sigillata* pottery was successful because it was a new product which did not have a demand in advance; but as soon it appeared, it managed to create and fill a ‘niche’ in the culture, by providing the customers with a new kind of vessel they perhaps did not exactly *need*, but which was esthetically pleasing and responded to a general interest in low-price luxury product.

Town territories as economic units?

The process by which the Romans assimilated the conquered regions to the statal (‘imperial’) structure has also been called ‘municipalization’, most notably by Jean Gagé. In the process called *adtributio* the existing rural institutions, villages and the like, were assigned under the administration of a nearby town, thus in practice making of possibly independent communities administratively subordinate communities. For example, in the case of *Vienna Allobrogum* (current day Vienne on the Rhône), there were over twenty original villages (*pagi*) subjected to its rule.²

Stephen Dyson stresses the importance of public boundaries for the Romans and that ‘the boundaries of every municipium were defined and clearly marked’.³ Based on the writings of Roman land surveyors, Campbell comes to the conclusion that the land register of a colony was kept in two places: one copy of the maps and other records, made usually of bronze, was kept at the colony, and a copy on parchment or papyrus was sent to the imperial record office in Rome.⁴

The case was different, however, when it came to pre-Roman towns incorporated into the Roman state. These towns often had pre-existing records which Romans supplemented with information from oral tradition. These did not prevent disputes, however.⁵ In the era of Republican colonization of Italy, this probably was not a big problem as often the land was just taken away from the original owners, centuriated, and given to the new colonists. The change in this practice was brought by the reign of Augustus when the earlier owners were compensated for the land that was taken from them.⁶

In the case of farm land, the control of the land and the right to its produce were conceptualized in simple terms. There was a ‘rightful owner’ who had the right to use the land, and it was a legal

1 Say 1855 I.xv, esp. sections 4–8.

2 178–182 Gagé 1964.

3 Dyson 1992, p. 122, citing Dilke 1971, pp. 98–108.

4 Campbell 1996, pp. 88–89.

5 Dyson 1992, p. 123. Dilke 1974, p. 568 gives a list of inscriptions about boundary disputes in Italy.

6 Campbell 1996, p. 81.

procedure to define the owner. What about other forms of land? Was the woodland in general always owned by someone? Was all of the land owned by someone? Did the town territories form a complete coverage of the land? Was all private land part of a town territory?

Campbell provides an answer to the first question: In allocating land for colonists, the woodland might be either given individually, to a group of colonists for common use or for the whole colony, and the same went for the land assigned for pasture (*pascuum*).⁷

In the land allocations for colonists, the surveyors did take into account of different types of natural resources, so the allocation was not only about just a plot of land. What emerges from their writings is a complex procedure which tried to evaluate the different kind of resources available in the land to be divided, like woods, groves of olives, vines, chestnut, acorns, and other kinds of trees sold for profit, also firewood. The local landforms then defined their allocation, and the resources allocated to a land-owner could well be situated at some distance from each other.⁸

In addition to the land that was divided and allotted, there were also those parts of the land that were not needed or wanted in the allocation, called *subsecivum*. This would cover areas like river fronts that can be hazardous for their propensity to flooding. The use of these areas could be granted to land-owners sharing a limit with this area, like, in the case of a river, to the land-owners whose plots were adjacent to the area reserved for the river and its flooding, or the use of an area could be given to the whole community. In either case, there was a tendency to appropriate these areas, mostly by the neighbouring land-owners, to their own use.⁹

In some cases, there were clear legal definitions that affected the use of natural resources. The wild or forest bees (*apes ferae in silvestribus locis*) were considered common property, and could be used by anyone.¹⁰ On the other hand, woodland could also be owned and was considered property in the same way as everything else; except for the fact that in the case of the woodland, *usus fructus* – right-of-use – often was separate from the actual possessions and could also be inherited.¹¹

Marketing patterns in towns

Let us assume that each town was an economically independent unit to the extent that the consumption patterns of pottery (and *terra sigillata*, in this case) can be analysed individually, without taking into account what these patterns in the neighbouring towns were. This assumption has to be made explicit in the beginning as the particular method used to analyse the *terra sigillata* collection in this section requires that each town is treated separately from each other. There is a potential gain in this type of an approach. In not assuming any similarity between the towns in advance, I still leave that possibility open without dictating the nature of the similarity. On the contrary, the analysis done in this section will allow me to see whether there was any similarity between the towns, and in the case there is, to find out which were the similar towns and how did they relate geographically.

To analyze the similarities and dissimilarities of the towns regarding their pottery consumption patterns, I begin once again with a quantitative analysis of the *terra sigillata* collection. The method used here is a relatively simple and traditional form of *cluster analysis*, a group of methods suitable for finding similar groups in data having multiple variables. Härdle and Simar define them as

7 Ibid., p. 91.

8 Ibid., p. 91.

9 Ibid., pp. 91–92.

10 Nenninger 2001, p. 42, citing *Dig.*, 41.1.5.2; *Inst. Iust.*, 2.1.14 and Columella, *Rust.*, p. 9.8.7 which all confirm this.

11 Nenninger 2001, p. 52.

follows:

[G]iven a data matrix containing multivariate measurements on a large number of individuals (or objects), the objective is to build some natural subgroups or clusters of individuals. This is done by grouping individuals that are ‘similar’ according to some appropriate criterion. Once the clusters are obtained, it is generally useful to describe each group using some descriptive tools . . . to create a better understanding of the differences that exist among the formulated groups.¹²

In this case, the unit of analysis is the town, or ‘findspot’, in the terminology used in the database. At first, the data is divided in ten-year periods. For each town (or findspot) and for each ten-year period, each stamp type in the database is marked with 1 to signify the presence of items bearing this stamp at this period in this place. Correspondingly, the absence of a stamp is marked with 0. Another option would have been to enter for each town and period the number of items found in one town, which would also allow for an analysis of the amount of items traded. In my opinion that would give too much emphasis on the later formation processes of the archaeological record; the relation between amounts of items found in one town and the amount of the items at one time marketed and consumed there is tenuous at best. The process of discarding and recovery of these items is very haphazard, and the introduction of the actual amounts would give too much weight to the uncontrollable influences of these processes. The use of a binary value to mark the presence/absence of the stamp at a site thus removes some of the randomness introduced by the formation processes, at the same time giving up on the possibility of using the relative amounts of different stamps in the analysis.

In this case, however, I find this choice justifiable also because the purpose of this section is to find out similarities and differences in the marketing practices behind the distribution of products from different producers. Whether these differences result from the agency of the producers themselves or the merchants distributing the items, the main choice must have been *where* to take the items, not how many. Consequently, this section is more interested in the presence of the products of a certain potter at a site than in the amounts found there.

As a result of this presence/absence classification, the data is formulated as one table for each ten-year period, each row of the table marking one town or another location (‘the findspot’), and each column marking the presence or absence during that period of the products bearing a particular stamp type. These stamp types are referred to by the coding used in the OCK².

The similarity between two rows is then calculated as a combination of the values in both rows. There are various similarity coefficients that can be used for assessing the similarity, and the scale of this work does not allow me to make a detailed analysis of all of them.¹³ The result of this process is a similarity (or distance) matrix, from which the calculated similarities (distances) between different data items, in this case towns, can be read.

The next step in this process is the combination of the data items, towns, into clusters based on their similarity. The point of this process is to arrive at some kind of grouping of the data that demonstrates a level of internal consistency within the subgroups. In principle, the first step of this combination process is simple: the largest value in the similarity matrix is taken, and the two towns linked by that value are taken together to form a new group, cluster. The process is continued by taking the next-highest value from the matrix and performing a similar kind of join,

12 Härdle and Simar 2007, p. 271.

13 A list of various similarity coefficients for binary and quantitative data can be found, among others, in Gower and Legendre 1986, Härdle and Simar 2007, p. 273 and in the documentation of the *ade4* module for R-stat. In general, the description of cluster analysis presented here derives from *ibid.*, which should be consulted for a more general description of the methods.

with the exception that this time, the previously formed new cluster has to be taken into account, too. There are various algorithms to use for deciding, how the distance of a cluster to other items and clusters are calculated; the most important of these are listed by Härdle and Simar.¹⁴

This process can be represented in the form of a tree. For example, the tree for the first period between 40 and 31 BCE is shown on figure fig. C.1 on page 161. On this figure, the y-scale on the left shows the level of dissimilarity, and on the x-scale are plotted all sites with *terra sigillata* finds in the study area. The clustering process starts from the top, i.e. from the highest level of dissimilarity. When descending towards 0, the first horizontal line, approx. at the level of 1.7, shows the level of dissimilarity at which Arretium is separated from the main group. This means that at this relative level of dissimilarity, all the other sites are closer to each other in their find compositions than Arretium. Thus, Arretium forms its own cluster at this level. On figure fig. D.1 on page 172 Arretium is labelled as 'Group 2'. The next division takes place at the dissimilarity level of approx. 1.2, where the group between 'Vulci' and 'Bientina' is formed. On figure fig. D.1 on page 172 this is the 'Group 1'. The absolute internal similarity of this group, i.e. the dissimilarity level within this group is 0, indicates, that these are the sites where no items have been found from this period. The two remaining clusters are formed at the level of approx. 0.8, and these are the only two real clusters in the sense, that there is a certain level of similarity within these clusters formed by sites that actually contain finds. These clusters are the groups '3' and '4' on figure fig. D.1 on page 172.

The clustering trees and the geographical extents of these clusters are presented in the Appendices D: 'Groups resulting from clustering' and C: 'Clustering trees'. The groups that are formed by this process during each period are summarized in table chapter 5 on the following page.

The clustering trees are comparable with each other. They are made of the same data and the y-scale of the figures is made the same on purpose so that the trees can be compared. This comparison brings out certain noteworthy features. One of them is that the highest join in the trees, or the total height of the structure, is in the beginning below 2 and stays there until period 'per20', when it rises to just above 2. The heights stay between 2 and 3 for the next 20 years or so, after which they start to rise upwards in 'per50', slowly reaching 5 and only descending to just below 4 after that until the end of the study period.

Now, considering the meaning of the growth of the tree height noted above, we can conclude that the internal heterogeneity of the data increases all through the history of *terra sigillata* production in Etruria. Whereas in the beginning the internal homogeneity can be interpreted through the absence of some stamps on almost all the sites – thus making the sites look very similar – a different kind of interpretation is needed to explain the very high trees towards the end of the production.

But the overall image that can be gained from these maps and figures is somewhat disappointing in the sense that very little geographical sense can be made of the material. If we had expected or hoped to find some geographical groupings in the data, showing the possible existence of larger-than-town consumption patterns – or marketing patterns, for the matter – these expectations would have been disappointed.

The only geographically marked feature that can be found on the series of maps can be seen in the somewhat remarkable consistency of a certain core group of towns. This begins already in 'per-30', ca 30 BCE, as Group 3 and continues until 'per0', ca. 1 CE. It is formed by sites along the *via Cassia*, the major road leading south from Arretium, and *via Aemilia Scauri*, major road leading from Arretium to the coast. For this period, Arretium itself is different from this group,, and otherwise, the only town consistently belonging to this group is Perugia, which clearly lies

14 Ibid., p. 277.

Table 5.1: Groupings of find spots according to their find composition.

Findspot	-40	-30	-20	-10	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	
Alberoro	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Arretium	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1
Bientina	1	1	1	1	1	1	1	1	1	3	3	3	3	3	3	3	2	2	2	2
Bolsena	3	3	3	3	3	2	2	2	2	2	2	2	2	2	4	4	3	3	3	3
Brolio	1	1	1	1	1	1	3	3	3	4	4	1	1	1	1	1	1	1	1	1
Capena	3	1	1	1	1	1	3	3	3	4	4	1	1	1	1	1	1	1	1	1
Capodimonte (VT)	1	1	1	1	1	1	1	3	3	4	4	1	1	1	1	1	1	1	1	1
Castel d'Asso	3	1	1	1	1	1	1	1	1	1	1	1	4	4	4	4	3	3	3	3
Castelluccio	1	1	1	1	1	1	3	3	3	4	4	1	1	1	1	1	1	1	1	1
Castiglione/Teverina	1	1	1	1	1	1	3	3	3	4	4	1	1	1	1	1	1	1	1	1
Castiglion Fiorent.	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Certaldo	1	1	1	1	1	1	3	3	1	3	3	3	3	3	3	3	2	2	2	2
Cerveteri	3	1	1	1	1	1	1	1	1	4	4	1	1	1	1	1	1	1	1	1
Chiusi	3	3	3	3	3	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3
Coltano	1	1	1	1	1	1	1	1	1	3	3	3	3	3	3	3	2	2	2	2
Cortona	1	1	1	1	1	1	1	1	1	1	1	1	4	4	1	1	1	1	1	1
Cosa	3	1	1	1	1	1	3	3	1	3	3	3	3	3	2	2	3	3	3	3
Ferento	3	3	3	3	3	2	2	2	2	2	2	2	2	2	4	4	3	3	3	3
Fiesole	3	3	3	3	3	2	1	1	4	3	3	3	3	3	3	3	2	2	2	2
Firenze	3	3	3	3	3	1	1	1	4	1	1	1	4	4	4	4	2	2	2	2
Isola di Migliarino	1	1	1	1	1	1	1	1	4	3	3	3	3	3	3	3	2	2	2	2
Livorno	3	1	1	1	1	1	1	1	4	3	3	3	3	3	2	2	3	3	3	3
Lucca	1	1	1	1	1	1	3	3	3	4	4	1	1	1	1	1	1	1	1	1
Luni	3	3	3	3	3	1	1	1	4	3	3	3	3	3	3	3	2	2	2	2
Marciano d. Chiana	1	1	1	1	1	1	3	3	3	4	4	1	1	1	1	1	1	1	1	1
Montefascone	1	1	1	1	1	1	1	1	1	4	4	1	1	1	1	1	1	1	1	1
Montepulciano	1	1	1	1	1	1	3	3	3	4	4	1	1	1	1	1	1	1	1	1
Monte Romano	1	1	1	1	1	1	1	1	1	4	4	1	1	1	1	1	1	1	1	1

Table 5.1: Groupings of find spots according to their find composition.

Findspot	-40	-30	-20	-10	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140
Nepi	3	1	1	1	1	1	3	3	3	4	4	1	1	1	1	1	1	1	1
Orvieto	3	1	1	1	3	2	2	2	1	1	1	1	4	4	4	4	3	3	3
Perugia	3	3	3	3	3	2	2	2	1	2	2	2	2	2	4	4	3	3	3
Pietrasanta	1	1	1	1	1	1	3	3	1	3	3	3	3	3	2	2	3	3	3
Pisa	3	1	1	1	3	1	1	1	4	3	3	3	3	3	2	2	3	3	3
Pistoia	1	1	1	1	1	1	1	3	3	4	4	1	1	1	1	1	1	1	1
Pitigliano	3	1	1	1	1	1	3	3	3	4	4	1	1	1	1	1	1	1	1
Pitigliano/Saturnia	1	1	1	1	1	1	3	3	3	4	4	1	1	1	1	1	1	1	1
Poggio Murella	1	1	1	1	1	1	1	1	1	4	4	1	1	1	1	1	1	1	1
Rignano Flamini	1	1	1	1	1	1	3	3	3	4	4	1	1	1	1	1	1	1	1
Roselle	1	1	1	1	1	1	3	3	3	4	4	1	1	1	1	1	1	1	1
San Lorenzo Nuovo	1	1	1	1	1	1	3	3	3	4	4	1	1	1	1	1	1	1	1
Sarteano	1	1	1	1	1	1	1	1	1	1	4	1	1	1	1	1	1	1	1
Saturnia	3	1	1	1	1	1	1	1	1	1	1	1	4	4	1	1	1	1	1
Settefemestre	3	1	1	1	1	1	1	1	1	3	3	3	3	3	3	2	2	2	2
Siena	3	1	1	1	1	1	1	1	1	1	1	1	4	4	1	1	1	1	1
Sutri	1	1	1	1	1	1	3	3	1	1	1	1	4	4	1	1	1	1	1
Tarquinia	1	1	1	1	1	1	1	1	1	1	1	1	4	4	1	1	1	1	1
Torrta di Siena	3	1	1	1	1	1	1	2	1	1	1	1	4	4	1	1	1	1	1
Vasanello	3	3	3	3	1	1	3	3	3	4	4	1	1	1	1	1	1	1	1
Veii	3	1	1	1	1	1	3	3	3	4	4	1	1	1	1	1	1	1	1
Vetulonia	1	1	1	1	1	1	3	3	3	4	4	1	1	1	1	1	1	1	1
Viterbo	1	1	1	1	1	1	1	1	1	4	4	1	1	1	1	1	1	1	1
Vitiano	1	1	1	1	1	1	3	3	3	4	4	1	1	1	1	1	1	1	1
Volaterrae	1	1	1	1	1	1	1	1	1	3	3	3	3	3	2	2	1	1	1
Vulci	1	1	1	1	1	1	1	1	1	3	4	4	1	1	1	1	1	1	1

outside the via Cassia road area; but a minor road connection to it can probably be assumed.

Around 'per0', or 1 CE, this group splinters, and the same towns in via Cassia region together with Arretium and Perugia continue together until per90, around 90 CE. The via Aemilia Scauri group then seems to become part of another group that forms in 'per40' around Pisa. (Group 4 on map 'per40', Group 3 from 'per50' to 'per90') This group covers the regions around Pisa up to Firenze and Fiesole, and descends along the coast all the way to Cosa and Settefinestre.

Although the data presented in this chapter does not provide us with any ground-breaking new interpretative possibilities, it is still worth while to note the importance of the major road network in the composition of the above-described groups. While in general it seems that the data is quite heterogeneous and the neighbouring towns do not demonstrate any markedly similar find compositions, thus ruling out any geographically definable market zones, it does also seem evident that the major land traffic arteries in the region did have some effect on the *terra sigillata* markets in the region; much more, in fact, than the river network. The effect of the coast cannot be judged, as the sites of Cosa and Settefinestre, during the period they belonged to the same group as other sites most probably supplied by Pisan products, were both coastally situated and located on the major coastal road, the *via Aurelia*.

All in all, this analysis, though not confirming, seems to suggest that the trade in *terra sigillata* was first and foremost a road-based operation.

6

Traders in the Empire

Whole-sale trade

Thus far, the study has concentrated on the region of Roman Etruria for valid reasons that were presented in the Introduction. The analysis of the data collection has enabled the construction of a possible model of trade and transport within the region: a system of many actors where both land transport and mixed modes of transport were valid forms of action, but where the network of major roads seems to have some defining influence on the resulting marketing patterns. The diffusion patterns of the pottery as well as the local consumption patterns were all heterogeneous, supporting the interpretation of the trade as not very tightly organized and mostly in the hands of individual actors; there are some signs of a tighter integration of the marketing patterns during the blooming decades of the *terra sigillata* production and trade, but this process probably included only a small proportion of the traders.

Besides the small-scale and heterogeneous Etrurian *terra sigillata* trade, the whole-sale trade was an important feature of the Roman economy. Frayn, in her study on the markets and market institutions in Roman Italy, concluded that whereas most of the items were actually traded through small-scale institutions, directly from the work shop, a connected *taberna* or by itinerant *circitores*, it was wine, oil and salt that did not form a part of this small-scale everyday trade. This was because salt was a state monopoly, and both wine and oil were large-scale industries that also required careful handling in storage and transport, therefore favouring the specialized merchants and shops in the trade.¹ One could surmise that grain was also part of these large-scale markets; and the summary of the state-of-the-research on the Roman grain trade by David Kessler and Peter Temin brings out well both the large scale of the operation as well as the developed institutions needed to run the trade.²

In the chapter on market mechanisms (chapter 4) I discussed briefly some of the physical institutions connected with trade. These were limited to the local scale, however, and the urban context knew one more institution connected with trade: the *emporium*. This was most probably connected with whole-sale trade, and in Rome, for example, was located by the river at the place where ships coming upstream from Ostia and the coast would land. The *emporium* was built outside the *porta trigemina* in 193 BCE, and its paving and the construction of the neighbouring *porticus Aemilia* was also reported by Livy to have taken place in 174 BCE.³ The location of this place was outside the old Servian walls, but close to the various *fora* SW of the main forum. In addition to this, another, somewhat later, port structure in Rome is also known: the *portus*

1 Frayn 1993, pp. 159, 162.

2 Kessler and Temin 2007.

3 Frayn 1993, pp. 15–16.

Tiberinus uncovered in the excavations during the years 1936–37. This large complex had a pier on the river bank and large storage rooms and was also dedicated to river transport, especially from the coast, as it lies just below the rapids by the *isola Tiberina*.⁴ Similar structures must have existed in large harbours all over the empire.

It must of course be remembered that maritime trade did not actually require any built harbour facilities. As told earlier (see p. 74), even large ships could be loaded and unloaded without any special structures. Houston combines this idea with a selection of ship-wrecks, in order to determine a typical size of Roman sea-going merchant vessels. His conclusion on the size of known vessels is that most of them were well below the known more recent examples of ships beached for loading. His conclusion therefore is that with the exception of the huge ships used in large-scale transport of for example grain, most trade by ships would not have needed any kind of permanent facilities. He also cited the lawyer Ulpian who, writing in the 2nd c. CE, defined the word *portus* ‘simply as “a protected spot, where goods can be loaded or unloaded”’.⁵

It does not seem that this kind of model occurred at all to Lionel Casson, when he wrote his classical study of the river transport from Ostia to Rome: ‘At Ostia, such skiffs would haul bigger vessels to as close to land as possible and smaller ones right up to a quay’.⁶ Very much of course depends, on what is defined as a ‘bigger vessel’. If we are speaking about the mammoths used to transport grain, with their 500+ tons carrying capacity, these were probably too large to be hauled ashore without causing structural damage. But in the case of Ostia, we have to keep in mind that there was no natural *portus* in the area besides the river mouth, and beaching obviously is not a choice when the weather is rough. The situation of course improved with the building of the imperial harbour at Portus.

With the exception of the large grain ships referred to above, the trade ships usually travelled with mixed cargo. This interpretation is based on the discoveries of ship wrecks, like the one of *Port-Vendres II*, which carried tin, lead, copper, oil, wine, fish sauce, almonds and pottery.⁷ Harris interprets this cargo as belonging to many merchants, although there is no way to prove or disprove this claim. Trading mixed goods would have been a wise and common policy in the premodern economies, where real-time information about market conditions was not available. Also Trimalchio, the main character in Petronius’s *Satyricon* and an enriched freedman of his own making, was presented as having dealt in mixed cargoes like this. Harris also notes that some merchants could specialize in certain goods, like wine, slaves or pottery, or to products of certain regions.⁸ One can question how this specialization in the products of certain regions could be demonstrated, for in a ship sailing from e.g. Hispania the presence of overwhelmingly Hispanic products in the cargo is hardly surprising.

In his comprehensive interpretation of the Roman economy Peter Bang devoted an entire chapter on the personal nature of the trade and merchants’ activity. In the light of this discussion, the idea of a merchant ship sailing around the Mediterranean, hailing the ports on a whim and as the need rises, is actually quite unrealistic. In the light of Bang’s evidence to be able to perform the merchant’s trade in a town, the merchant had to be able to form connections within the town. The trading relations on the whole-sale level were not purely commercial price-quality-amount-negotiations, they were social practices that resemble more a friendship than a modern day commercial activity. In Bang’s ‘Imperial Bazaar’ the trader was naturally bound to certain

4 Pisani Sartorio, Colini and Buzzetti 1986.

5 Houston 1988, pp. 556–558, 563–564, citing *Dig.*, 50.16.59: ‘*portus*’ *appellatus est conclusus locus, quo importantur merces et inde exportantur*.

6 Casson 1965, p. 33.

7 Colls and Etienne 1977.

8 Harris 2000, p. 732.

trade networks where he had the necessary connections; the network could be expanded but only with preparations.⁹

Bang's model supports Harris' interpretation presented above. Bang's merchant would have specialized in practising his trade in the places he knew, he was known in, and he had contacts in; and often also trading in goods the markets of which he was familiar with. On the other hand, this should not be taken so far as to claim, that all the merchants ever traded in was single products between single end-points; the evidence, especially from medium-sized ships, still points to a considerable variety in the cargo composition; but the end-points of the trade routes will remain unknown in the absence of any evidence of ship's logs.

A demonstration of the multifaceted nature of the trade operated by medium-sized vessels is the case of two shipwrecks from the Corsican waters, which seems to point to different types of actors behind the trade. The wrecks *Sud-Lavezzi 2* and *Lavezzi I* were both found near the southern tip of Corsica, and the comparison of their cargoes and some other characteristics of the ships demonstrates well, how difficult it would be to create a functioning single model of trade that explained both of these two ship.s

In the case of *Sud-Lavezzi 2*, the wreck has a surprisingly homogeneous cargo in the form of ingots of lead. They were all founded by the same producer, whose brand as in the mold was MINVCIORVM. In addition to this 'producer brand', all ingots bear stamps from two different dies, basically AP.IUN and ZETH. Both appear usually at least once, but often there are multiple appearances of one or both of these. Judging by the photographs, it seems that these were struck on cold ingots, i.e. post-production, and their positions do not show any obvious regularity. In addition to these stamps, many of the ingots bear scratched markings of roman numerals that do not form a continuous series; in fact, many numbers appear more than once and some never. What is also interesting in the case of this wreck is that the anchor found beside the wreck also bears these two stamps – AP.IUN and ZETH. Liou and Domergue, who published a report on the investigations at the wreck in 1991¹⁰, made the obvious conclusion that both the ship and a major part of the cargo were owned by the same person, one Appius Iunius Zethus, who in turn was a freedman of Appius Iunius Silanus, an important Roman senator during the Claudian period. This, in turn, would imply that the trade actually practiced by this ship would have been more or less an operation of the senator Iunius. One could still ask, why the two stamps, AP.IUN and ZETH, were separate on the ingots, and not joined together, as in the anchor APSE. Without further documentation, the proposed answers to this question will remain speculative, but one possible solution would be this: the ship itself 'belonged' (in one form or another) to the freedman Zethus, thus the anchor bears only his personal stamp that includes also the initials of his patron. The ingots, however, do bear the stamps of both men, individually. There is no means to ascertain, whether the stamps were pressed at the same time on the ingots, and one explanation for the double stamping could be that the lead production was A. Iunius' business, so all the ingots produced bear his stamp, whereas the transport, and possibly some further stages, were the business of Zethus, therefore his stamps appear on the ingots found on his vessel; or then the trade was a joint operation of the patronus and the freedman, and two separate stamps are a sign of this, whereas the ship was in the possession of the freedman, perhaps given by the patronus, but legally Zethus' own. This must be left undecided.

In contrast to this homogeneous cargo, the other wreck, *Lavezzi I* provides evidence of a very different kind. The ship was smaller, and especially the remains of the cargo are much more heterogeneous. The ingots of copper and lead on this ship contain a much larger variety of names, and the producer's stamp on the ingots was not nearly as refined as on the lead ingots

9 Bang 2008, 239–289 (chap. 5, 'Community').

10 Liou and Domergue 1990. This is the number of *Archaeonautica* of 1990, but it did appear only in the 1991.

of the *Sud-Lavezzi 2*. Also, whereas in *Sud-Lavezzi 2*, the amphoras found formed a systematic collection of three types for three products¹¹, the collection of amphoras on *Lavezzi I* was much more heterogeneous with at least ten different kinds of amphoras found in the cargo. It is quite evident that this ship carried merchandise from a larger variety of producers and perhaps also merchandise of lesser quality. Telling is that whereas some fine ware pottery was found on *Sud-Lavezzi 2*, the pottery found on *Lavezzi I* was of very common type.¹² The stray items of fine ware in this case would suggest a degree of relative prosperity of at least some people on *Sud-Lavezzi 2* – probably at least Zethus himself – compared to the people on *Lavezzi I*. The heterogeneity of the stamp collection on the lead and copper ingots, together with the presence of multiple amphora types, points towards a different kind of trade model for *Lavezzi I*, a model in which the ship may have been a more egalitarian environment, perhaps so that each person working on the ship may also have been a trader of his own right; the ship in this case could have been shared property, or then independently owned by its captain.¹³

Already based on material from these wrecks, relatively contemporaneous and of similar provenance, we can conclude that there was no single ‘operating model’ for maritime commerce. These two ships, and their cargos, represent two different models of action, one probably large-scale and ultimately part of a senator’s business organization, the other perhaps a result of teaming of resources by various small- or medium-level commercial actors. The traded items were still the same, and whatever the market conditions at either end of this sailing route were, they still left room for both of these practices.

Another interesting case demonstrating the variety of practices is the city of Patavium (modern Padova). According to Strabo, the city sent large amounts of clothes to the markets of Rome. Patavium was situated close to modern day Venice, around 30 km from the sea, and on a river called Medoakos (current day Brenta) that connected the town to the sea. For the products of its artisans, the Patavians used ships and the sea to reach the markets of Rome – a lengthy trip around the peninsula.¹⁴ The implications of this piece of evidence are not limited to the statement that the sea transport in the case of the clothes must have been so cheap as to make this long round-trip still worth while; also, there must have been a considerable quantity of these clothes to send, and from the fact that a ship was used to transport the clothes around the peninsula *directly* to Rome we can safely assume that the senders could be certain that the clothes were actually wanted, accepted and paid for upon arrival. And it seems evident that Strabo is writing about sending the clothes to Rome for sale, not selling them to ships coming to the harbour.

On the whole, this logistic chain can be interpreted further by asking, what kind of practices bind together the implications drawn from Strabo’s description. One option is to suggest the presence of a major actor in the clothes trade, existing at any one point of the chain. If the ‘big actor’ was present on the Patavian end, either in the form of a local merchant or the captain-merchant of the ship coming to the harbour, the actor could have taken care of the procurement, transport and sale of the clothes locally produced; but in this case, the destination Rome would perhaps not be so obvious. The big actor could also be present at the other end of the chain in Rome, which would fit well Strabo’s description, but would certainly require a high level of trust on the part of the Patavian senders – while the commercial law perhaps could offer the necessary legal instruments for a binding agreement in a case like this, it is questionable, whether the legal

11 Dressel 20 for oil, Haltern 70 for wine, and Dressel 28, perhaps also for wine. Liou and Domergue 1990.

12 Liou 1990.

13 And there is even a case that demonstrates features common with both of the cases above: In the wreck of *Saint-Gervais 3*, several different Antoniniani lost amphorae. As their names suggest, they might have been fellow freedmen of the same owner-become-patronus. Harris 2000, p. 735

14 Strabo, 5.1.7: δηλοῖ δὲ καὶ τὸ πλῆθος τῆς τεμπομένης κατασκευῆς εἰς τὴν Ῥώμην κατ’ ἐμπορίαν τῶν τε ἄλλων καὶ ἐσθῆτος παντοδαπῆς τὴν εὐ ἀνδρίαν τῆς πόλεως καὶ τὴν εὐτεχνίαν.

institutions were strong enough to actually put the agreement into effect in a situation like this. The actor at the Roman end would have been quite secure in the knowledge that even if he did deceive his Patavian suppliers, they could never reach him through legal means. Bang's 'Imperial Bazaar' might come to help here: a trading-friendship between the Patavian suppliers and the Roman commercialist could offer the guarantees needed for this trade to function.

It does in fact not really matter at which level the so-called big actor functioned, a logistic chain of this length and scale is by necessity built on trust at one or more places of the chain. The producers cannot themselves take their products to the Roman markets, and the Roman buyers cannot themselves come to the producers to buy the products, so middlemen there must be; and in the case of Patavian clothes trade, they seem to be big.

While contrary to the ideas expressed earlier about the occasional profitability of the land transport, this does not in fact invalidate the reasoning used to reach those conclusions. As we noted above, the amounts of items traded must have been considerable, and whatever was traded from the regions of the Empire to the city of Rome itself should always be considered as a 'special case', not representative of the 'general trading practices'. In all likelihood, the trade to Rome must have been a considerable part of the total trade that took place, but still the position and importance of Rome in the trading patterns was such that trade to Rome should be seen as one kind of trading practice and all other trade as something else.

Pottery trade

In his classic study on pottery, David Peacock wrote: 'Pottery, as such, was not normally the major product traded. It tended to be traded alongside other more important goods ...'¹⁵ This is usually quoted in support of the idea that pottery can be used to illuminate the patterns, if not the scale, of trade in general but that it should not be studied as a trade item of its own.¹⁶ This theory, however, confounds trade and transport by equating them. A better formulation of the relation of incidental pottery trade and trade in general would state that pottery tended to be *transported* alongside other more important goods; the difference in meaning being the separation of trade from transport. Especially important this separation is when we consider just the nature of the pottery trade as an *incidental* by-product of the transport of the major trade items, grain, wine, oil, etc. The pottery transported on the vessels running the major trade was not necessarily traded at the same time as the main trade item, the pottery could just as well have been traded separately by the captain or any other ship personnel, too.

The case of the Pompeian pottery hoard illustrated the importance of pottery in its own right. In an atrium house in Pompeii (8.5.9), a hoard of ceramics was found. It was in the form of a box, containing seventy-six *terra sigillata* bowls and thirty-seven lamps. The bowls were of south Gaulish origin, and the lamps originated in Northern Italy.¹⁷ The amount of items and their nature of their packaging suggests that they were intended for redistribution in Pompeii and imported from relatively far away. In addition to having been imported from far, they were also brought from the 'other side of Rome'; meaning, that every logical route from their place of production to Pompeii more or less passed Rome relatively close by. The obvious question is, why were they not taken to Rome, where the main markets were? If the transport of these items had been a side-product of another kind of larger transport, they probably would have ended up in Rome. There are at least two possible interpretations for their 'illogical' fate: 1) they were specially meant for the Pompeian markets, in which case they were a) either specially ordered

15 Peacock 1982, p. 154.

16 Greene 1992; Laurence 1994, p. 53; Gill 1991.

17 A detailed description of this collection is in Atkinson 1914.

from the producer, or b) the marketing was organized to such an extent that they were specially sent to Pompeii; and 2) the price a piece of *terra sigillata* could fetch in Pompeii compared well to the price it would fetch in Rome. The number 2) is especially significant in the light of the local competition, which existed for both lamps and *terra sigillata*.¹⁸

And this is not an isolated case. Giovanni Pucci has studied, among many other things connected with *terra sigillata italica*, an assemblage of *terra sigillata* from Pompeii, and analyzed the origins of the products. A large part of them seems to come from outside Campania, which is once again surprising, as for example Puteoli was a centre of production in itself.¹⁹ Based on the pottery evidence from the House of Vestals in Pompeii, Eric De Sena and Janne Ikäheimo have concluded, that before ca. 50 BCE most of the consumption was of local origin, from the neighbouring areas, but that after 50 BCE the imports gain in prominence, with more than one third of the pottery being imported from outside the region.²⁰ There is evidence of similar development elsewhere: A comparative example from Corinth is provided by Slane.²¹ And in the end, it was not only the Pompeian pottery consumption which drew products from many different areas, it was also the Pompeian products that were distributed over a wide area. Pompeian Red Ware has been found in Greece, North Africa, Italy, Germany and Britain, and the distribution seems to compare well with the distribution of the *terra sigillata* produced in Puteoli.²²

So it seems that in spite of the almost ubiquitous local production of various pottery types, there was still import (and export) on a significant scale. How were the imports able to compete with the local production?

Ray Laurence's solution for the competitiveness of imported products with local production in Pompeii goes as follows: The shipping costs would be covered by the 'more valuable' cargo that was the primary reason for the transport in the first place. This was formed by products which were not available in Pompeii, and thus could bear the additional costs incurred by the transport without losing competitiveness. The rest of the cargo, then, consisted of products with competition from local production. These products were in this case transported 'for free' because the transport costs were covered with the price of, for example, Spanish *garum*. Therefore, '... the maritime trade in staples rode upon the back of a trade in luxury items ...'²³ This might explain a lot, especially in the case there was not enough of the primary item, e.g. *garum*, available, and the cargo space would otherwise have been left half empty. In this case, to include goods that could be sold with low profit would bring larger absolute income than to sail with the ship empty; but there is evidence that pottery was not always considered as cheap filler of the cargo space.

We should also quote Pliny the Elder in this context. He tells explicitly in many paragraphs, how ceramic vessels were valuable, could be luxury items and were traded over long distances over sea, because they were of known good quality. In this case Pliny brings up the pottery productions at Trallis and Mutina, which both were widely known and traded.²⁴ The importance of pottery as a trade item in itself is also demonstrated by the wreck of Culip IV, where *terra sigillata* formed a major part of the ship's cargo. The wreck was found by Cala Culip, or Cap de Creus, the easternmost part of the Iberian peninsula, halfway between Narbonne and Barcelona.

18 Laurence 1994, p. 52.

19 Ibid., p. 53.

20 De Sena and Ikäheimo 2003.

21 Slane 1989.

22 Peacock 1977; Laurence 1994, p. 54.

23 Laurence 1994, p. 69.

24 Plin. *HN*, 35.60 *Habent et Trallis ibi opera sua et in Italia Mutina, quoniam et sic gentes nobilitantur et haec quoque per maria, terras ultro citro portantur, insignibus rotarum officinis.*

From	Amount
Arretium	2085
Central Italy	1955
Pisa	276
Arretium/Po Valley	75
Scoppieto	74
Etruria	65
Arretium/Pisa/Lyon	64
Pozzuoli	70
Vasanello	40
Torrta di Siena	17
Po Valley	9
Lyon	8
Etruria/Lyon	7
Campania	5
Cales	5
Pisa/Lyon	5
Venosa?	5
Lyon?	2
Cales?	1
Vienne	1
Arretium/Lyon	1
(Unknown origin)	1076

Table 6.1: Imports of *terra sigillata* to Rome by production place. Based on data from OCK².

The principal cargo on this ship was *terra sigillata*, produced in the region of La Graufesenque in Southern Gallia and most probably travelling south.²⁵

Even this superficial treatment of the pottery trade in general has demonstrated that as in the case of the Etrurian marketing practices, also here there are no simple models to explain all trade. Sure, some trade probably was a side-product, and some pottery was transported just to fill the cargo, but on the other hand, pottery was obviously important, occasionally valuable in itself, and also, could form the main cargo of a vessel in itself. The multiplicity of practices is evident.

The trading patterns and practices studied earlier in this study support strongly a view of the trade as often operated by multiple small-scale actors. A general summary of the *terra sigillata* trade to Rome is enough to show, how important the regional production was for the pottery supply. In table chapter 6 on the current page we see a summary of the *terra sigillata* items found in Rome. The items are divided according to their production place, and even a glance at the numbers is enough to show, that almost all of the *terra sigillata* found in Rome originated in Arretium and its surrounding regions. We will have a closer look at *terra sigillata* trade outside Etruria in the next section.

²⁵ Harris 2000, p. 726; Nieto 1986, 86–87, *passim*.

Terra sigillata trade

Gallic production – Italian or local?

Local production of *terra sigillata* is well attested in all of the northern provinces, and often the local production continued long after the whole industry had died out in Italy. Also, the first signs of local production appear quite early. The site of *Lyon–La Murette* was a short lived centre of *terra sigillata* production in the northern provinces, but in spite of this, it is a very important and particular place. Its period of activity seems to have been between 10 BCE and 10 CE. What makes the La Murette site particularly interesting is the fact that many of the names that appear in the stamps on items made here share the *cognomen* with the large Italian producers, like Ateius, Attius, Rasinius, Sentius and Thyrsus. In addition to these, there are also names which do not appear on stamps originating in Italy. What is also interesting is the lack of any kind of introductory period in the production, a period when the products were of inferior quality reflecting the need of the potters to learn the skills properly. At this site, the production began immediately at high quality. The production of La Murette seems to have been intended only for the northern markets, as items made here have been found in the three Gallic provinces, Germania and northern Raetia, with some stray items in Britannia.²⁶

It seems logical to draw from these facts the conclusion that the La Murette site was a filial for many Italian producers reaching out to the northern markets, perhaps in response to the local competition. The familiar *cognomina* show a direct link, and even more strongly, the immediate good quality of the La Murette production suggests strongly that the potters who set the production up at the site were already professionals, perhaps sent from the main centres of Arretium and Pisa to set up a filial. The appearance of many *cognomina* known from the Etrurian production suggests also that this might have been a joint venture of a group of Italian producers, which does raise interesting interpretative possibilities.

The local competition, which in the end proved to be the winner in the competition, is centered around three major sites, all showing high levels of production both in quality as in quantity. The sites are La Graufesenque, Lezoux and Montans, all situated in the south-western France, all clearly south of Lyon, and none of them by a great river. These three sites all share similar qualities. Names familiar from Italian production are minor players here; even Ateius, perhaps the biggest family in the field in Italy and especially important in the exports to north, is minor in La Graufesenque. Also, two of these three sites (La Graufesenque and Montans) show a slow rise to good quality. Each of these sites started as a local production, and the distribution spread slowly to the regional scale. And also, each of these places was a large scale, durable operation that together took the dominant place in the markets that the Italian and La Murette production had had earlier. It is only in the second decade CE, after the production at La Murette seems to have ended, that the products of these places started to reach the northern parts of the Empire – and this happens at the same time the local production at these sites loses its connection with the forms of the Italian items.²⁷

But why did the local production overtake the early professionals at La Murette? This is a very complicated question, and a full analysis of it is beyond this work, but some points can still be presented.

The La Murette site seemed to have all the advantages on its side. It had the professionals who immediately started producing good quality ceramics, indistinguishable from the Italian originals. La Murette was situated at Lyon, the Roman-day Lugdunum, at the confluence of the rivers Rhone

²⁶ *Conspectus*, pp. 19–20.

²⁷ *Conspectus*, pp. 18–19.

(Roman *Rhodanus*, orig. Greek Ροδανός) and Saône (Roman *Arar*), and an important node in the communication networks of the northern provinces. The two rivers are both navigable, although occasionally slightly challenging, but provide Lyon with important waterways both to the Mediterranean and to the Eastern parts of Gaul. Because of its good natural connections, Lyon also became an important centre in the road network constructed by the Romans in the Gallic provinces.

Considering the position of La Mulette just by this important node of traffic and the high quality of the *terra sigillata* produced there, it is difficult to understand how for example a place like La Graufesenque could ever even compete with it. As was noted above, the quality of its products was not that good in the beginning, and in addition, the site is located far from navigable rivers, with long land transport required before reaching the better connected centres.²⁸

The only obvious explanation I can find is that La Mulette simply lost the competition, and that the competition must have been about the price. We have to keep in mind that the probable Italian origins of the La Mulette production also resulted in Italian practices being introduced to the production. What were these practices? We do not exactly know, but we know the results: well made, high-quality vessels that had a certain ‘classy’ look to them, and that were part of the local process of identity reconstruction to Romanness. In the Italian way of production, the ovens had been small and the workers skillful, and from what we know of, for example, La Graufesenque, neither of these applied to it: at La Graufesenque, as we saw, the quality was mediocre, and from La Graufesenque we also know some of the biggest pottery ovens ever that could take thousands of vessels at one time. Perhaps Southern Gaul was the China of its times? Low levels of wages for large amounts of unskilled or lowly skilled workforce made production in quantities so cheap that the products could compete just with their price, even to the extent that the difficult logistic situation was not enough to hinder the conquest of the markets.

Paul Middleton’s now classic analysis of the marketing practices at the *La Graufesenque* production site concludes with an interesting suggestions as to the possible reasons behind this site’s success, which started and ended abruptly. The site was an important center of productions starting from the Claudian period until the early Trajanic period, at which point the production declined strongly, although there can not be seen any change in the actual demand for *terra sigillata*. Up to this point, Middleton has brought to our attention the apparent logistical difficulties of producing items at this somewhat remote location, which was not immediately on any important transport route, and at the end of his analysis, he asks whether these two might actually be connected. And, in his interpretation, they are because in the vicinity of *La Graufesenque*, remains of a Roman silver mine have been found. These mines would have been a large and rich enough of a site to attract a regular transport service to the region, to which the *terra sigillata* trade would have been easily attached, riding ‘piggy-back’ on the transport of silver.²⁹ It is questionable how this piggy-back trade could have catered to the commercialization of the tens of thousands of items coming out of the La Graufesenque production; perhaps it was useful in the beginning.

28 Just by looking at the map it might appear that La Graufesenque is situated by the river Tarn which would provide it with good connections. As Middleton notes, however, this river is hardly navigable close to the pottery production site and therefore could not have been used for transporting breakable items. The only alternative seems to have been overland transport either to the coast or to the nearby town of Narbonne (Roman *Narbo*), at a distance of slightly less than 100 km. Middleton 1980, 187, passim.

29 Ibid.

A case study: Velsen

The site of Velsen at the northern ends of the Roman *Limes* is a good example of the wide-reaching diffusion of even Italian products in the northern provinces. In their publication of the site, Glasbergen and Lith have listed in two tables the *terra sigillata* from Italy (Abb. 2) and Southern Gaul (Abb. 3).³⁰ Below, in table 6.2, I have listed the stamps Glasbergen and Lith have interpreted as Italian with my own identifications of the stamps based on OCK². In addition to the OCK identification for each stamp, I have included the suggested production sites and the activity periods of these sites. Almost without exception, the stamps called Italian on this site come from Pisa; also, some of this ‘Italian’ production has now been identified as actually having been produced in the potteries of Southern Gaul (Items 1, 2, perhaps 13–15, 30, 31). The only two items that perhaps come from Arretium are the items by M. Perennius (Items 35 and 36), with the second of these bearing a stamp that is not known based on the Italian evidence.

In addition, comparison of the items Glasbergen and van Lith labelled South Gallic with the identifications in *Conspectus*, it is possible to question some of their labels. For example, the South Gallic plates with stamps by MACCARI (Items 62 and 63, Abb. 3), are of form Dragendorff 27, which corresponds to the *Conspectus* forms 31 and 32, both of which are interpreted as Italian production by the editors of the *Conspectus*.³¹

Without going into a deeper re-analysis of the Velsen finds, the Velsen material allows us to draw certain conclusions. First, the major presence of Italian items at a site this far from the production sites indicates that the Italian production was at least during the late 1st c. BCE and early 1st c. CE important for the pottery trade within the Gallic provinces. Even with the local competing production of Southern Gallia, the Italian items were competitive in the markets; and in fact, while comparing the presence of these two item groups in this area, it has to be remembered that whether the items were produced in coastal Etruria or Southern Gallia, they had to travel a long route overland to reach the region where Velsen is; or optionally, they have to travel around the Iberian peninsula. The sea transport from Pisa to Southern Gallia was negligible in comparison to these trips.

Second, – and this is relevant also in the case of the South Gallic *terra sigillata* – there are many different versions of the stamps from one producer. This is important for the implications it has for the marketing process of *terra sigillata*, especially concerning the suggested origins of the site as being connected to Germanicus’ third expedition to the mouth of the Ems river in 16 CE.³² This dating, however, is questionable, especially based on the evidence of *terra sigillata*. Most of the identified stamps in the table above actually date from a somewhat earlier period, and a comparison with another site also supports a somewhat earlier dating for this site: At Saintes (ancient Mediolanum Santonvm) the stamps’ composition is very similar as it is in Velsen, with the members of *gens Atei* being major producers along with Cretus, Xanthus and Zoilus. However, in the Saintes collection, the Italian production disappears completely around 15 CE, after which it is the Southern Gallic production which dominates, and the change from Arretine to Pisan happens around 10 BCE.³³

For example, Simonetta Menchelli is of the opinion that the trade of *terra sigillata* to the provinces of Gallia and Germania was directly controlled by the *gens Ateia*, and that this trade was closely connected to the *annona* of the army. She does concede the point that we do not know, how the production, transport and sale of these were organized, but that the work of

30 Glasbergen and Lith 1977, pp. 15–18.

31 Glasbergen and Lith 1977, pp. 13, 17; *Conspectus*, pp. 106–108.

32 Glasbergen and Lith 1977, p. 5.

33 Tilhard 1992, pp. 236–237.

Table 6.2: List of stamps on Italian *terra sigillata* at the site Velsen I.

No.	Stamp text	Interpretation	Production location	Dating
1	ACA	ACASTVS, OCK 17	Lyon La Murette	10–1 BCE
2	ACA	ACASTVS, OCK 17		
3	CN·ATEI	OCK 276, subt. 43	Pisa	5 BCE – 40 CE
4	CN·ATEI	Very similar to OCK 276, 30–41		
5	CN·ATEI	Perhaps OCK 276, 37		
6	ATEI	Exactly OCK 268, 118	Pisa	5 BCE – 25 CE
7	ATEI	Exactly OCK 268, 100		
8	ATEI	Very much OCK 268, 110		
9	ATEI	Exactly OCK 268, 108		
10	CN·ATEI	?	?	?
11	CN·ATMAE	Very much OCK 299, 26	Pisa	5 BCE – 20 CE
12	AT/..	?	?	
13	CRESTI	Prob. OCK 698	Pisa/Lyon	10 BCE – 30 CE
14	CRESTI	Prob. OCK 698		
15	CRESTI	Perhaps also OCK 698		
16	E]VHOD	Most cert. OCK 787	Pisa	5 BCE – 40 CE
17	XANT	Most cert. OCK 2535	Pisa	5 BCE – 20 CE
18	XANTH	Most cert. OCK 2536	Pisa	5 BCE – 50+ CE
19	XANTH	Exactly OCK 2536, 130		
20	ZANTH	Most cert. OCK 2536		
21	XANTH	Most cert. OCK 2536		
22	X(ANTH	Exactly OCK 2536, 125		
23, 24	ZANTH	Most cert. OCK 2356		
25	XAN	Exactly OCK 2356, 78		
26, 27	X·ANTI	Alm. exactly OCK 2356, 57		
28	ZOILI	Like OCK 2544, 51–53	Pisa	5 BCE – 50+ CE
29	ZO[Most cert. OCK 2544		
30, 31	COM (?)	OCK 599 ?	La Graufesenque	10 BCE – 10 CE

No.	Stamp text	Interpretation	Production location	Dating
32	MAC	?	?	
33	MPA	Similar to OCK 1346, 3	Pisa?	10+ BCE
34	M-P-A	Similar to OCK 1347, 1	Pisa?	10 BCE – 10 CE
35	MPE/REN	Exactly 1391, 12	Arretium	20 BCE – 20 CE
36	MPE	Trefoil stamps for M.Perennius not in OCK	?	
37	PRIMI (?)	Could be OCK 1531 or 1535	Pozzuoli / Po Valley	15 BCE – 30+ CE
38	VOLVSI	Most prob. OCK 2523	Pisa	10 BCE – 20 CE
39	VO[Perhaps OCK 2523		

Maurice Picon shows that of the material at the site of Haltern, most of the Ateian pottery in residential areas was of Pisan origin, whereas the camp pottery was from the succursals in Lyon.³⁴ On the other hand, the Italian producers with a presence in Velsen were to a large extent the same that were also known in Britannia: Crestus, Xanthus and Zoilus.³⁵ And also the work of Maurice Picon on pottery from Vienna and Gallia in general supports the idea, that there is a difference between the eastern and the western parts of the northern provinces, as also here the Arretine and Pisan production is well represented.³⁶

It does seem, then, that the trade of Italian sigillata to Gallia was organized differently from the trade within Etruria, and that the trade to Gallia was perhaps in the hands of a few major actors. But also in this case, we have to allow for differences. The military installations on the Germanian border were major consumers of pottery, and the importance of Ateius for these centres does not necessarily imply a similar importance for the western parts of these provinces. In fact, the Velsen find assemblage is in conflict with the ‘monoculture’ of the Haltern military site, and the implications of this conflict most probably point to differences in marketing practices. I’d like to propose, that whereas the *terra sigillata* trade to the eastern parts of the northern provinces most likely was in the hands of certain major actors, the western parts were supplied by small-scale traders: a model supported both by the evidence from Haltern and from Velsen.

To Conclude

In the chapters previous to this one, considerable effort was spent in analysing the pottery trade within Etruria. It became apparent that this never could have been a centralized form of activity, as summarized in the beginning of this chapter. The result may, in a way, seem self-evident, but they only acquire importance when compared to what is known about the *terra sigillata* trade to Gaul. The large-scale activities and perhaps supply to the military seem to have been the way of the trade in this region, and the contrast to the Etrurian practices is marked and interesting.

If we draw these conclusions to a higher level, we can also claim that the choice of this study to concentrate to a regional level has been significantly productive. There was a marked difference between the practices within Etruria when compared to the practice of trade to Gaul; naturally, the limited scope of this study does not actually allow us to confirm this, as similar analyses of Gallic pottery should be done for to achieve similar levels of signification.

But to conclude, the main result of this study is that local variation does exist in the Roman world, and also, regional scale is something that matters. The Empire was not only about towns and their territories, there were cultural regions within it, too that had their own particularities that were not limited to speech and dress but, in the lack of a universally accepted science of economy, matter also in the questions of production and trade, or, livelihood and survival.

34 Menchelli 1997, p. 193; Picon 1995, p. 405.

35 Menchelli 1997, p. 193.

36 Picon 1995.

Conclusion

Tracing the pot

In the first chapter of this study ('The analysis of *terra sigillata* distributions') a preliminary study of both the data of OCK² and the practices of production showed superficial homogeneity that could easily lead to an interpretation of the Italian *terra sigillata* industry and trade as a simple phenomenon. Although *terra sigillata* as a label had seen multiple definitions, and there were problems in deciding, what the more specific type of *terra sigillata italica* meant and how the somewhat later African and even later still Gaulish production relate to this term, this 'conceptual vagueness' turned out not to be relevant in the case of the data used in the study. The development of *terra sigillata italica* production was summarized with simple statistics based on the data and turned out to be unsurprisingly regular. Geographical diffusion on the wider scale proved to be very uneven, but this was interpreted as a feature of the research tradition and not a feature of the data itself; however, the study area had to be delimited geographically to those areas with a certain homogeneity, both in the context of the Roman state and in the context of the research traditions. Within these geographical limits, there were two main production areas, and their development was summarized easily based on existing research. The first hint of the multiplicity of practices behind the production was acquired with a look at the stamps and stamping practices. Then it was discovered that there are multiple explanations for these stamps. Many of these can co-exist easily, and for the data the implications are minimal; for the cultural analysis the implications were more profound, while they contested the superficial homogeneity mentioned above. The preliminary analysis of the data from the viewpoint of the production places and general features of the major stamps from these places did restore some of the broken homogeneity by forming a coherent, logical image of the *terra sigillata italica* distribution patterns.

In the second chapter ('The social context of Etrurian *terra sigillata* production') the focus was on production, and especially the context where the production of *terra sigillata italica* started. The socio-political narrative that formed the core of the chapter was centred on the wars of the late Republic, where Etruria was one of the main battlegrounds, and on the effects these wars and their consequences on the local communities. The main argument was that *terra sigillata* production was not something that started by accident; it was a combination of both local traditions in pottery trade and a certain precarious situation imposed upon the local land-owners by the punitive measures taken by the victorious part in the internal struggles of the Roman Republic. A selection of Etrurian communities were analyzed from this viewpoint, and it was found, that it was only at Arretium where the combination of local traditions and especially the position of the community after the Sullan victory over Marius were such as to force the local elites to adapt to the new situation in ways that made the adoption of *terra sigillata* industry

a logical choice. Elsewhere, this process did not happen, as the conditions were different, and it was concluded that the adoption of *terra sigillata* production was a logical selection of an economic survival strategy in the particularly Arretine context, and that the adopters of this strategy most probably were the local land-owners whose ownership of the land was transformed into a possibly temporary right of possession.

In the third chapter ('Routes of trade and transport') the focus was switched from production to transport. After an introductory discussion on the transport costs in Antiquity and premodern cultures in general, the chapter was structured around two different analyses where the transport costs were modelled based on the physical geography of the study area, in the first case based solely on the idea on land transport, in the second case with the waterways included as potentially cheaper modes of transport. The results of these both were then compared to the actual distribution of the pottery based on the database to estimate whether the model of sole land transport or the model of mixed modes of transport better fitted these distribution. It was discovered that *both* models could be used, but that both models required different assumptions on both the nature of the distributive institutions and on the importance of quality vs. price in the acquisition of these items. A strong result, however, was that these two models are both possible and applicable, and there is no compelling reason to abandon either one. However, the static nature of the models and the temporally undifferentiated data made it impossible to estimate, whether there could have been a temporal change from one model to another.

In the fourth chapter ('Market mechanisms') the data was studied with different means. This time, it was the purpose of the chapter to assess the development of the marketing practices of *terra sigillata*. Based on the analysis of variance and its principal components it was possible to suggest that there were multiple actors in the field, and that soon before the major peak of Etrurian *terra sigillata* production, the markets started to consolidate. The evidence seemed to suggest a possible formation of larger marketing organizations, perhaps in the form of companies or *collegia* also otherwise known from the sources. However, the evidence was not too strong, so the nature of the organization of the trade needed to be addressed also in the next chapter.

The fifth chapter ('Market zones and patterns of consumption') became an almost direct continuation of the fourth with a slightly different emphasis. In this chapter, the idea was to compare the different towns in the region based on the compositions of the *terra sigillata* collections recovered in these towns. The towns were collected in 'clusters' based on the similarity of these find compositions divided in ten-year periods; and although in general the results proved to be less than satisfactory, two important observations were made that support the interpretations made in the earlier chapters. Two 'regions of stability' were found in the data that actually correspond to some extent to the results of the fourth chapter: the group along the *via Cassia* and *via Aemilia Scauri* from ca. 30 BCE to ca. 1 CE corresponds to the relative stability of the variance curves in figure 4.5 from 'per-20' to 'per0'; and at the end of the study period, two later groups, one around the *via Cassia* region, the other centred on Pisa, around ca. 90 CE that is visible in figure 4.5 as a descent in both variance and total amounts from 'per90' to 'per100'.

The close compatibility of the results from both chap. 4 and 5 seems to confirm that both of these analyses do speak of the same phenomenon, and thus the results from both can be used in making a common conclusion. In the second and third chapter of this study the purpose was to show how both *terra sigillata* production and distribution in many cases could have been small-scale, local practices, logical in their particular context but not necessarily generalizable to a model capable of explaining *other* forms of production not items of trade. The production found its logical origin in Arretium, but the interpretation of the analysis of the transport methods was not able to conclude anything definite. In the light of the increasing organization of the distribution found in the fourth chapter, the mixed-mode transport model does acquire some

credibility, but the emphasis on roads as compared to waterways as the main common factor behind the marketing zones found in the fifth chapter makes me still want to favour the land transport model as the more probable one; especially since a boat supply to the *via Cassia* zone would have had to use the Clanis valley waterway which was reported by Pliny to be only irregularly navigable. Also, the *via Aemilia Scaurus* route had the possibility of using the Arno river, but also there, the route was not uninterrupted.

In the sixth chapter ('Traders in the Empire') the *terra sigillata* production and transport were contextualized on the wider level of the Roman Empire. It was found out that the structures of the long-distance trade were not that dissimilar to the practices found within the Roman Etruria. The evidence of ship wrecks demonstrated that also in the case of shipping and ship transport, the field was open to different forms of action, and that the ships and their cargo could result from different types of trading organizations from centralized businesses to individual entrepreneurs. In the case of pottery trade, the Pompeian evidence was enough to show, that the 'commercial logic' behind the long-distance pottery trade is not easily decipherable. Pompeii and Campania were both areas of pottery production and consumption, and the presence of imports from elsewhere as well as the presence of local exports in other areas of the Empire point to a field of commercial activity where the costs of transport most definitely were not the decisive factor in the formation of distribution patterns and local assemblages. Pottery travelled wide and far, both in its own right as well as a side product along other cargo. It also became evident, that in the Gallic case, the transport geography had less-than decisive effect on the success and failure of local production; it seemed to be other factors that decided which production would be successful in the market than the location chosen. And finally, the case study of the small site of Velsen questioned the simple model of army-instigated large-scale *terra sigillata* trade to the north; even if that was the model of how the trade to the frontier worked, it was not the case with the small community on the northern rim of the Gallic region.

* * *

In a relatively recent book of his (*Les structures sociales de l'économie*, 2000) Pierre Bourdieu builds a non-quantitative model for economic action. His emphasis is on actual economical practices and learning-while-doing. As a consequence of this, Bourdieu finds that the word *reasonable* ('raisonnable') is more suitable than *rational* ('rationnelle') to describe the nature of the economic practices. The role of conscious planning is small as the practices are performed based on reasonable assumptions of their outcome built on earlier experiences; the 'rational' mode of cost-profit calculations and such plays only a minor role in Bourdieu's model.¹

While the application of this model to modern-day economies is questionable, the Bourdieu way of envisioning modes of economic practices seems very applicable to ancient cultures – and Bourdieu himself has constructed the model based on life-long work with the economic practices

1 Bourdieu's description of what he means by *reasonable* as compared to *rational* is worth quoting at some length: « *L'économie des pratiques économiques*, cette raison immanente aux pratiques, trouve son principe non dans des "décisions" de la volonté et de la conscience rationnelles ou dans des déterminations mécaniques issues de pouvoirs extérieurs, mais dans les dispositions acquises à travers les apprentissages associés à une longue confrontation avec les régularités du champ; ces dispositions sont capables d'engendrer, en dehors même de tout calcul conscient, des conduites et même des anticipations qu'il vaut mieux appeler *raisonnables* que *rationnelles*, même si leur conformité avec les estimations du calcul incline à les penser et à les traiter comme des produits de la raison calculatrice. L'observation montre que, même dans cet univers où les moyens et les fins de l'action et leur relation sont portés à un très haut degré d'explication, les agents s'orientent en fonction d'intuitions et d'anticipations du sens pratique, qui laisse bien souvent l'essentiel à l'état implicite et qui s'engage, sur la base de l'expérience acquise en pratique, dans des stratégies "pratiques", au double sens d'implicites, non théoriques, et de commodés, adaptées aux exigences et aux urgences de l'action. » Bourdieu 2000, pp. 20–21

of non-western people. The quotation from Bourdieu I presented in Introduction (page 19) demonstrates that also Bourdieu considers this 'otherness' in economic practices to also be a characteristic feature of the past in addition to other cultures.

Interestingly, this agrees very well with what Finley wrote about the ancient economies, as presented in the Introduction to this work. Also in Finley's view, the idea that the ancient's would have operated according to a modern-day commercial logic was untenable, especially since there could not have been that theoretical superstructure which would have enabled one to conceptualize one's own economic actions. I think Finley would have agreed with Bourdieu's view that the ancients' economic behaviour was acquired while doing and based on the reasonable assumptions on the outcome of the actions.

I find that the analysis I have presented above does support this kind of interpretation of the Romans' economic activities. Using the various statistical and geographical analyses, I have been able to deduce some trends and long-term changes in the material that might reflect just the kind of learning process that results from the practical trial-and-error way of operating: at some point some activities, some transport routes, some market places that perhaps previously had been profitable lost that possibility and were dropped out of a particular trader's circuit. On the other hand, we do have some evidence of some kind of consolidation of the markets at some point, which could indicate the formation of larger groups, perhaps *collegia* or even *societas* of traders; however, this never became the rule. In the later periods, these seem to dwindle out, and what remains, seems to be the back-bone of the trading activities in the region: small-scale uncoordinated traders, most probably itinerant and connected with the *nundinae*.

Also, it can be safely concluded from the heterogeneous material that *terra sigillata* production and trade, at least in Etruria, was no centrally organized matter. There is not sign of any larger mastermind nor institution organizing the production nor trading patterns, but there were clearly some actors in the field that were larger than others.

Roman Economy and *terra sigillata* trade

To conclude this work, it shall be necessary to contextualize the above discussions within the discussions of the nature and history of roman economic system in general. First of all, it is to be noted, that the whole discussion of this study is temporally situated within the flourishing centuries of the Roman economy in general. Willem Jongman has on various occasions summarized various archaeologically based markers that construct a convincing 'grand narrative' of the Roman economic history. These markers consist of population, chronology of dated shipwrecks, metal pollution in the Greenland ice core data, and meat consumption. Demography of the Roman Empire, population size of Rome and other towns, and the relative amount of urban vs. rural population in the ancient Roman world are not new subjects of study, and the results presented by Jongman are more a kind of a summary of the generally accepted trends in population. The population of the Roman Empire went steadily up starting from the Late Republican periods, with many parts of the Empire reaching population densities that would not be reached again until modern times. The regional variations were large, but the general trend was clear, and according to Jongman, the Antonine Plague of 165 CE should perhaps be seen as the turning point of the demographic curve. The amounts of ship wrecks, on the other hand, peak between 200 BCE and 200 CE, with the Late Republic seeing the highest numbers in ships, and this is taken usually to indicate that the level of ship traffic on the Mediterranean was at its highest level during these centuries. The mining, on the other hand, was the cause of the high levels of metal pollution discovered in the ice core samples collected in Greenland. These samples show a rapid decrease in the late 2nd century CE, and here Jongman cites Andrew

Wilson, who has studied the Spanish gold mines at Rio Tinto, where the activities ceased around these times but not for the lack of gold in the mines. In addition to these, Based on animal bone data Jongman has deduced that meat consumption between the 1st century BCE and 4th century CE was much higher than any time before and considerably higher than after this period, indicating a wider level of intermediate prosperity than before or after these centuries.²

Individually each of these indicators used by Jongman could be contested. The lack of ship wrecks might be a result of different packaging used for the products – wood tends to disappear in the Mediterranean environment relatively quickly, and if the containers were switched, for example, from clay amphoras to wooden barrels, the cargos disappear along with the wrecks –, the drop in ice core pollution levels a result of the movement of the extraction processes or changes in the overall wind patterns elsewhere and so on. On the other hand, together all these indicators show, that both the living standards as well as the aggregate levels of production, consumption and trade were high for a long period during the Roman rule; and the *terra sigillata* production and trade studied in this work is in any case well within this period of prosperity. The *terra sigillata* production and trade were not an isolated phenomenon in the economic development of the Roman world, but one of the many features of the economic prosperity of the Late Republican and Early Imperial periods.

In the beginning in the work (see discussion starting on page 14) an interpretation of the Weberian rationality types was introduced. It should be obvious, that the multifaceted nature of the productive and commercial practices described and analysed in the study can not be made to fit a clean and pure model; however, the two kinds of rationality, ‘substantive’ and ‘rational’, can still be discussed here, especially in the light of Finley’s groundbreaking reformulation of the principles of analysis of ancient economies. As he pointed out, the work of Xenophon called *Oikonomikos* was principally a ‘work of ethics’ and a ‘practical work’, focusing on the training and management of the slaves and the wife, and agronomy. This observation expanded to a full-fledged distrust of all economic concepts for the study of the Greek and Roman worlds in general.³ He disavowed the current day economic concepts and their use in understanding activities that to us seem definitely economic for he saw that the logic implied by the use of these concepts just was not there. Reinterpreted in the Weberian terms, Finley could be seen as removing the ‘rational’ rationality, it being based on the ‘purely means-end calculation’ (on page 14), for for Finley, the economy was ‘embedded’ in the ideology of the society. ‘Ideology never divides neatly along class lines; on the contrary, its function, if it is to be of any use, is precisely to cross those lines, and about wealth and poverty there was a remarkable unanimity in antiquity. Trimalchio was a more authentic spokesman than Plato.’⁴ There was no discussion whether wealth was good or bad in itself, only whether the means of its acquisition were honourable and the uses of it proper.⁵ This ‘embeddedness’ turns economy into an activity which is subordinated to the value system, i.e. ideology, of the Roman upper classes – and especially upper classes in Finley’s analysis. His examples and citations tell of a world where the status of a man was everything, and increasing wealth was an important method for increasing the status, too; it just had to be done in the right way.⁶ In the light of Finley’s view, the most appropriate ‘rationality type’ for the upper class economic practices would be the ‘substantive’, as the economic was subordinate to the ‘real’ object of accumulation, honor and social standing, and in this situation, the most profitable economic

2 Jongman 2007b, pp. 242–244. On demography and population, see also Hopkins 1966; Scheidel 1996; Storey 1997; Kron 2005; The ship wreck data is summarized also in Parker 1992. Meat consumption and diet also in King 1999.

3 Finley 1999, 18–19, *passim*. in Chap. 1.

4 *Ibid.*, p. 38.

5 *Ibid.*, p. 38.

6 *Ibid.*, Chap. 2.

7. Conclusion

activity was not necessarily the one that brought most money in; however, even though in the quotation above Finley defended the significance of this economic ethos for the Roman society, his formulations were decisively based on upper class sources and activities. For example in the case of the town of Lyon, Finley himself emphasises how the actors in this economic hub of the Northern provinces were all but citizens: locals, foreigners, freedmen, etc.⁷ The question still remains, whether the locals and freedmen running the provincial hub of Lyon would have found similar values important.

What has been found out about the practices of the *terra sigillata* producers and traders is in accordance with the Finleyan interpretation of the practical performance of economy being limited to the lower classes. In this respect, this study resonates also well with another, more recent formulation of the economic system of the Roman world, namely the ‘Roman Bazaar’ presented by Peter F. Bang.⁸ Bang’s bazaar was not the modern day tourist trap found in the Maghreb and Near East but an economic system of its own, that

is broad enough to accommodate both the peddling of small batches of ornamented, red slip tablewares by traders travelling with a few pack animals between the rural fairs and numerous villages of the Roman countryside, and the considerably fewer merchants traversing the Middle East and Indian Ocean to bring back each year a fairly limited number of more valuable cargoes.⁹

In Bang’s world, the traders were a precarious lot, not enjoying the legal protection nor the social standing of the early modern European merchants.¹⁰ In the lack of the social standing and state support, the merchants and traders formed associations to support each other. The *collegia* known from, for example, the *piazzale delle corporazioni* in Ostia, or the various associations of traders found in the northern provinces¹¹ are such organizations.

Bang’s argument for the low social standing of the traders is even stronger than Finley’s, and nothing in this study suggests otherwise; but considering the nature of the ideology of the traders, nothing supports either the existence of a value system other than ‘rational’ – the ‘rational’ on the level of itinerant traders and small producers being on the level of the layman economic thinking (see page 19): sell items for a higher price than you paid for them.

It is interesting to note that leaving out the traditional main marketing areas of *terra sigillata* produced in Etruria, Rome and the Germanic frontier, a picture of the *terra sigillata* trade emerges that brings out the small-scale peddlers behind the regional practices. There is nothing in the results of the chapters above that suggests a central organization to the trade; nothing that points to the existence of a large scale organization ordering these practices, transport routes, marketing zones of commercial practices of *terra sigillata* within the Roman Etruria. In the last chapter it was brought to light that studies have shown that the presence of *terra sigillata* on the Germanic border was the result of a large scale operation, but the material from Velsen discredited the generalizability of this model as a general model of marketing for Gaul. The results of each of these chapters are just as reasonable assuming that the actors were acting solely on the layman commercial logic, where the traders bought the products from places that were practical from the point of their area of activity and where the distribution followed the road network, also supporting the idea of itinerant traders with some pack animals touring the Etrurian towns.

Considering Finley’s slight derision of layman’s economic logic, it is pleasing to note, that it is exactly this layman’s logic that is quite enough to explain one form of economic practice

7 Finley 1999, p. 59.

8 Bang 2008.

9 Ibid., p. 304.

10 For example Hale 2001 for Florence, where the merchants formed the core of the community.

11 Schlippschuh 1974, pp. 109–123.

in the Roman world. As to the pervasiveness of the upper-class ideology, the results of this study are not too supportive; on the other hand, they do not deny its influence, but what seems evident based on this work is that even if the ideology was shared, it is not readily visible in the resulting *terra sigillata* distributions. In a way that is completely understandable: the upper class economic ideology was basically oriented to gaining social status and power. This did not make the members of the upper classes less greedy nor less needy of money, but it made them subordinate their activities to appearances. This subordination did not need to take place on the level of regional *terra sigillata* trade, just as little as it seemed to be a necessity for Finley's local Lyonnaise merchants and businessmen, not being citizens and thus not able to share the social ambitions the citizens had. In the Etrurian case the dividing line was of course not the citizenship itself, as in Italy all people by definition were citizens after the Social Wars, but this fact does not lessen the social hierarchies itself, it only forces them to structure themselves on other than purely legal grounds. And whatever the ambitions of either 'lesser' or 'greater' men were, it does not seem that they were played out in the field of *terra sigillata* production or trade.

Postscript: Further work

The nature of this study is such that many of the chapters have remained by necessity somewhat superficial. It is my sincere hope that by giving up some depth in analysis has enabled me to take the study of *terra sigillata* trade, and traders in general, to a somewhat higher level of abstraction. To put it straightforwardly, each of the chapters in this study could easily have been extrapolated to an independent thesis of its own. On the other hand, the wider approach taken in this work, I hope, has, by contextualizing the individual arguments to other related arguments, brought forward new questions that were not obvious before beginning the study. I will here describe some of these further openings made visible by the work done above.

In chapter 1 ('The analysis of *terra sigillata* distributions') the study of individual potters and their distributions could be taken much further by studying the individual stamp diffusions in more detail. More could be said about each potter and his activities, based on the data in OCK² and on what we know from other sources. In combination with the argument in chapter 2 ('The social context of Etrurian *terra sigillata* production'), the individual potter names could be subjected to a more detailed analysis of names, families and *gentilicia*, to find out more about the individual producers in the region. In the same way, the analysis of the sociopolitical context could be taken to a different level by a detailed analysis of what happened in the colonization process, what were the fates of the various towns in the region, and what does the local archeological and inscriptional evidence tell about the matter.

The analysis of transport routes in chapter 3 ('Routes of trade and transport') would clearly profit from a temporally divided approach, along the lines that was performed in the later chapters. In addition, the model of the infrastructure and different routes could be furthered by actually considering the effect the actual roads might have on the model, especially in the light of chapter 5 ('Market zones and patterns of consumption'), where it was discovered that the major land traffic arteries do seem to have a kind of an effect on the find compositions in towns.

The developments that could be made in chapters 4 and 5 are mostly limited to the statistical and GIS methods used. The choice of tools used in this study was limited to a small amount of the possible, and for example in the clustering, the selection between different algorithm used in distance calculation and cluster creation might have a surprising effect on the data; but this would also require an analysis of these different algorithms and their individual properties, a process that could be interesting more generally, but all in all a complex and time-consuming operation that was way beyond the scope of this study.

7. Conclusion

The final chapter (6, 'Traders in the Empire') has barely scratched the surface of the theme 'trade and traders in the northern provinces', and even a study of the *terra sigillata* trade in the region would be a significant undertaking – very much comparable to the work done in this work, with the exception that there is no database as comprehensive of the items found in Gaul as there was for this work; the coverage of the northern provinces in OCK² is much less complete.¹²

On another level, the nature and function of the traders' associations would be an interesting subject, too. Starting from the original formulation of the concept of *collegia* by Theodor Mommsen in 1843¹³, the interpretations of the function and significance of these institutions has been a widely discussed matter which – at least according to an insightful analysis by Jonathan Perry – is still dictated by Mommsen's interpretation and responses to it.¹⁴

In this study I have made evident what are the potentials of the database used in the analysis and the methods used in analysing the data – the original spatio-temporal studies accompanying the database were considerably more limited in scope and depth. On the other hand, the limitations of a study of this kind have also become evident. The analysis is able to bring forth new interpretative models that can be used to assess old interpretations and explanations, but as is the case always in historical studies, it is not able to provide any definite answers. The models remain just what they are, interpretative schemes that bring forth certain aspects of a potential historical existence.

12 A recent addition that I was unable to use fully for this work is Mees 2011, where the *terra sigillata* distribution in the northern provinces is analyzed in detail.

13 Mommsen 1843.

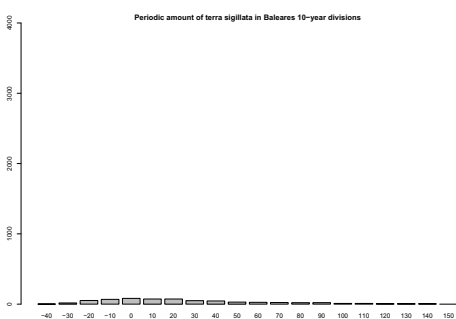
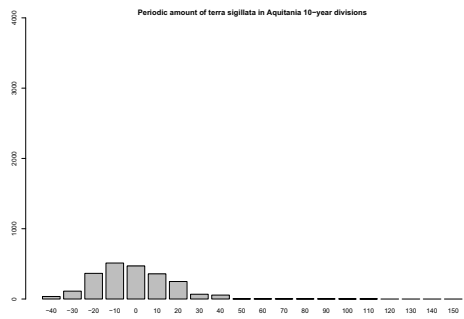
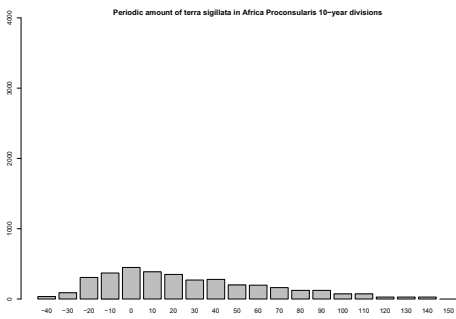
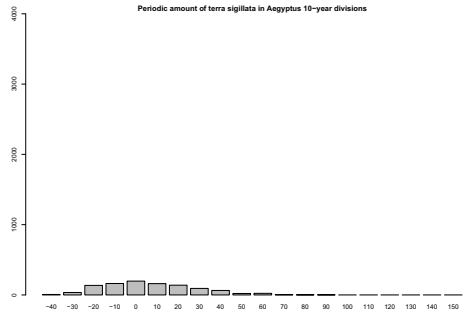
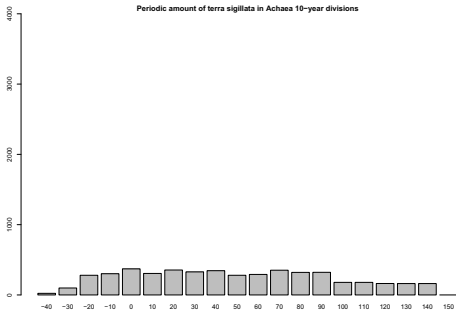
14 Perry 2006.

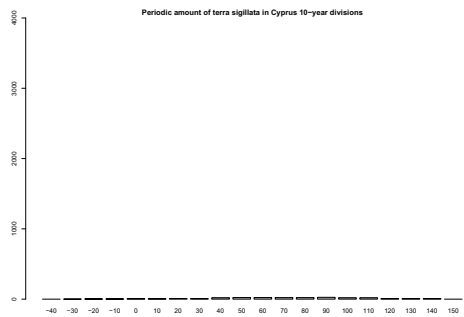
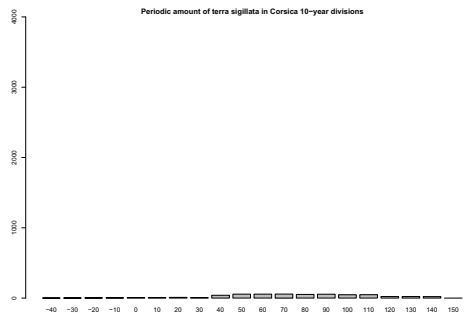
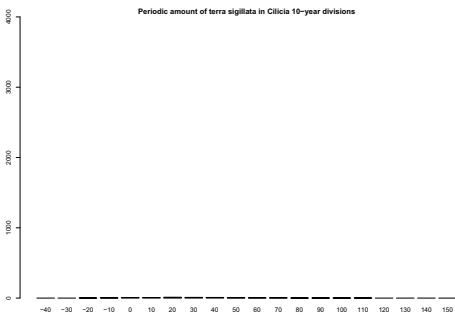
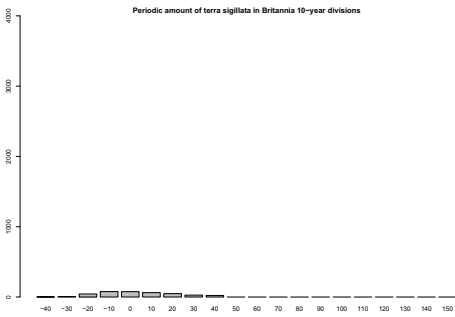
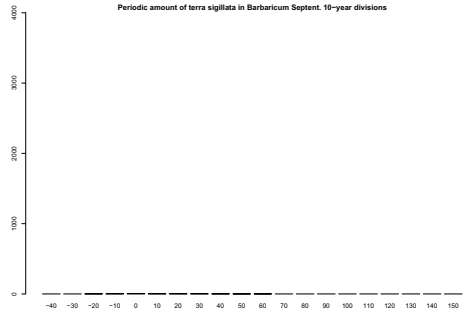
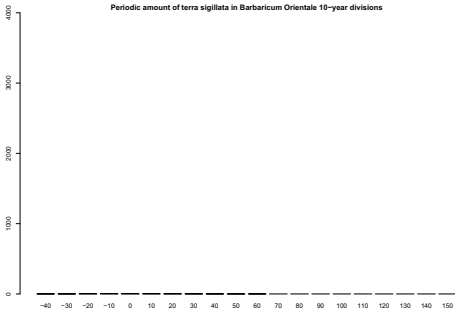
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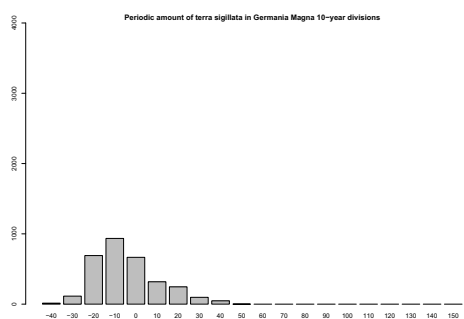
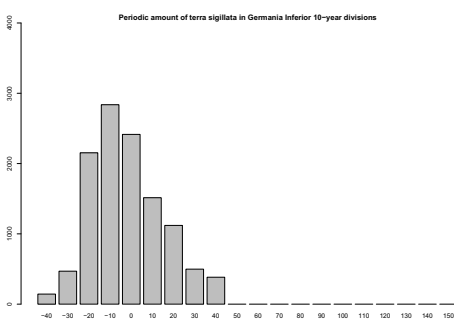
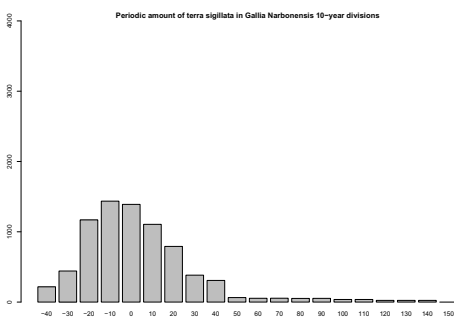
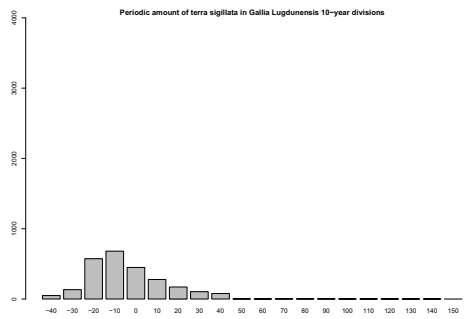
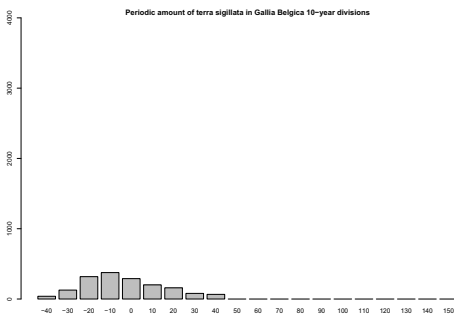
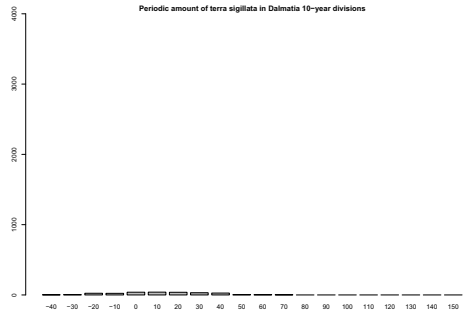
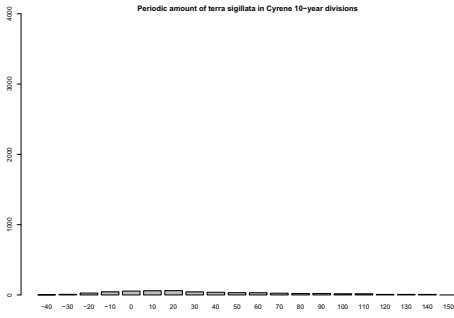
Overall summaries

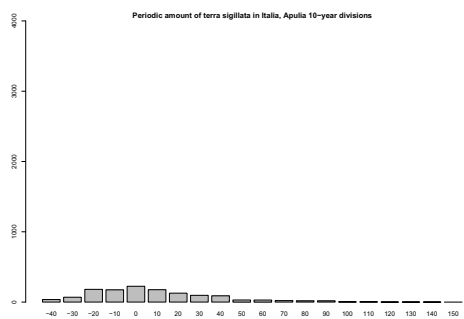
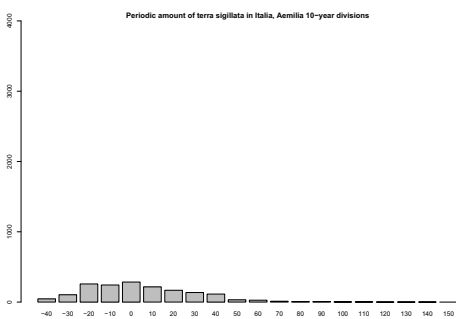
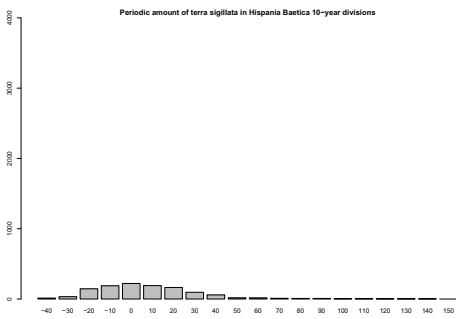
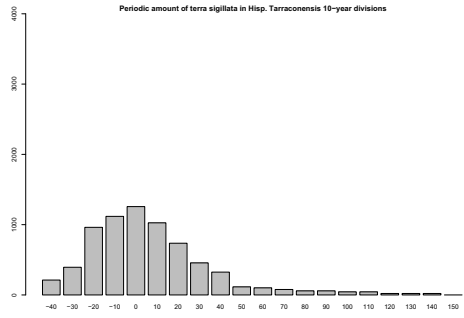
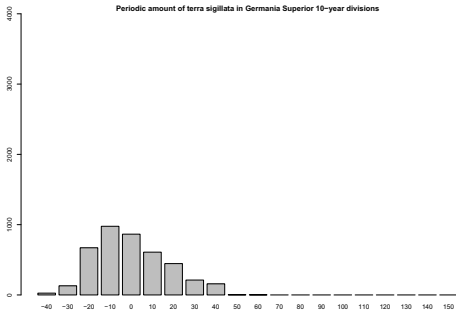
This appendix contains a variety of overall chronological summaries of the OCK² database. The first pages contain a series of figures, where each figure shows a summary of the Roman provinces, with each figure showing the amount of items in the database that have been recovered in these provinces and that can be dated. The next few pages contain a grouping, where the individual provinces are joined together to form larger areas. The last pages show similar figures as the first pages, but based on these composed areas.

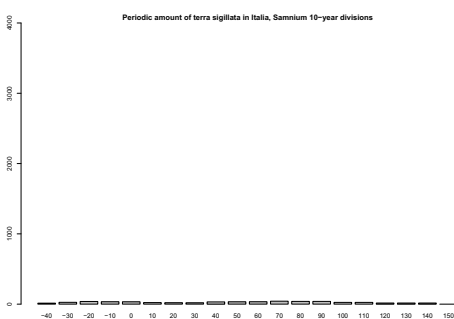
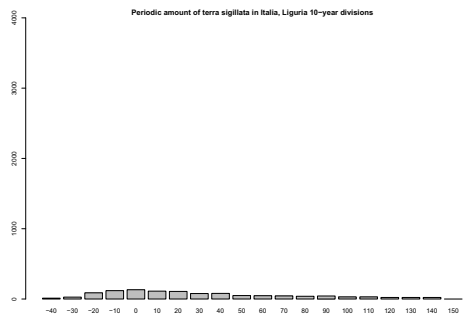
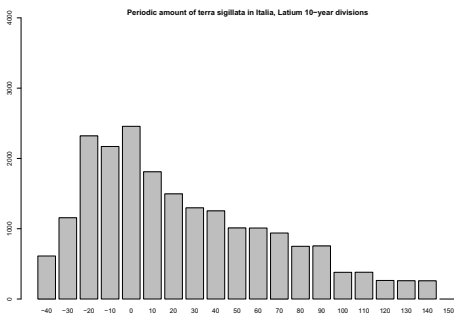
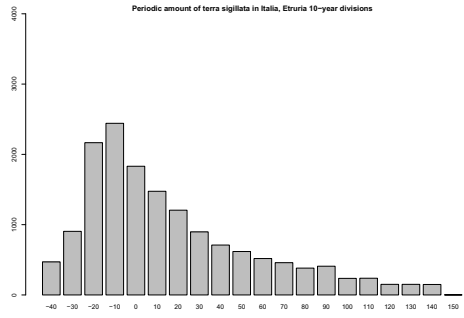
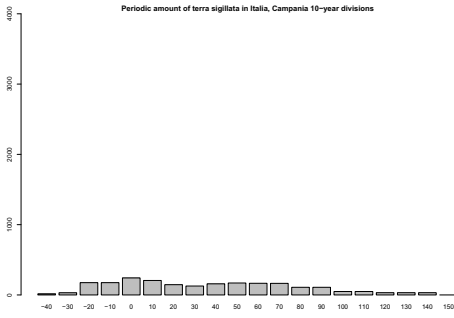
The larger areas called ‘Central Italy’ and ‘North’ are evidently the areas with most items. ‘Hispania’, ‘Northern Italy’, ‘Northwest’ and ‘Africa’ also contain significant amounts of items, whereas the rest of the empire is rather empty. As discussed in the actual text, this is most probably a result of the research tradition, and does not reflect the actual diffusion of *terra sigillata italica*.

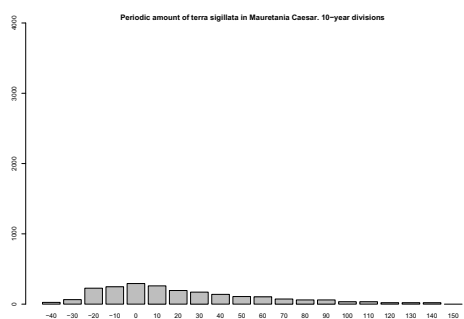
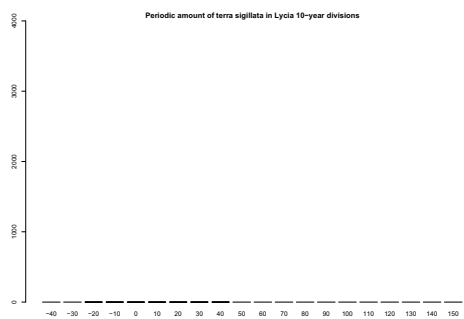
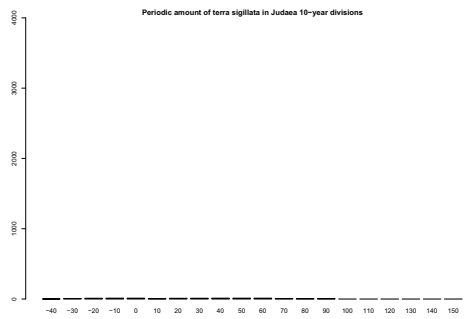
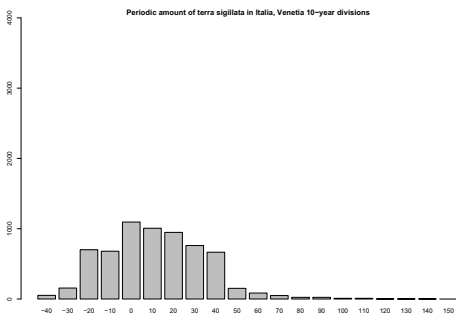
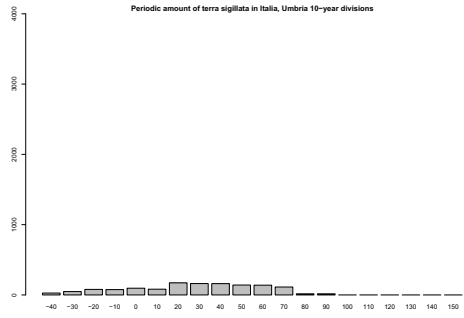
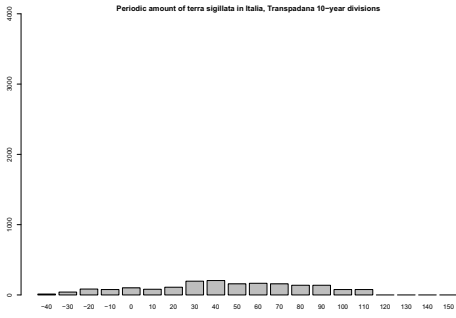


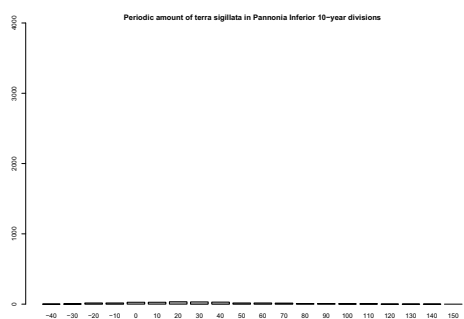
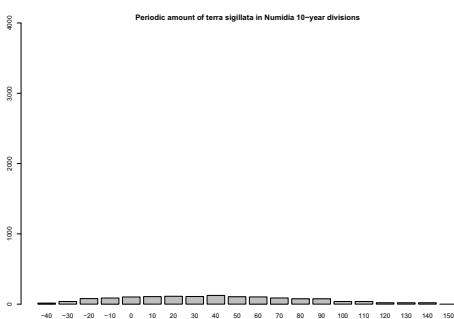
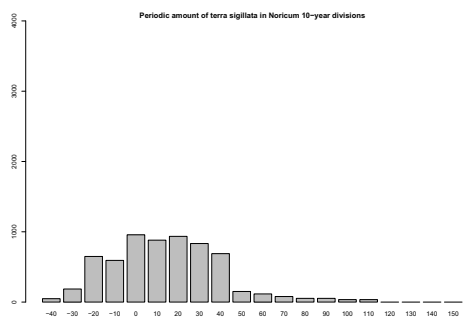
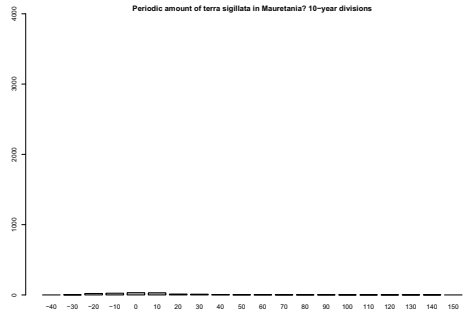
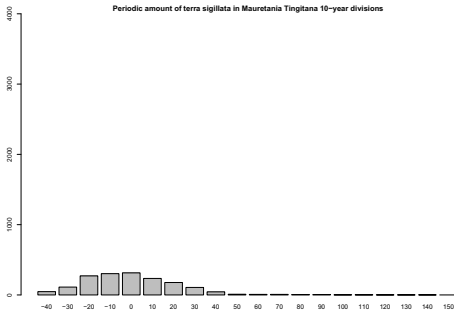


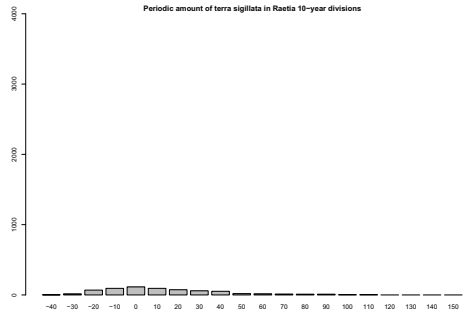
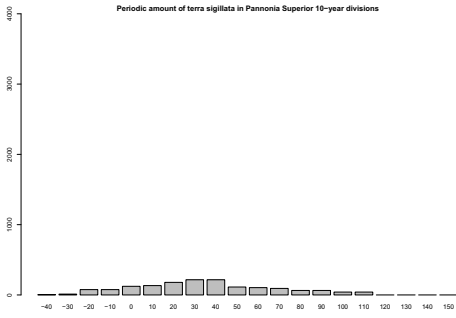








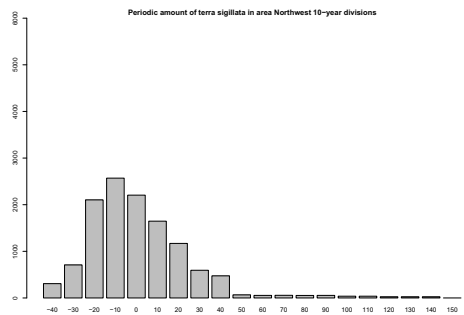
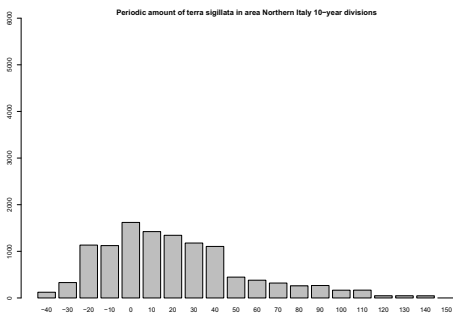
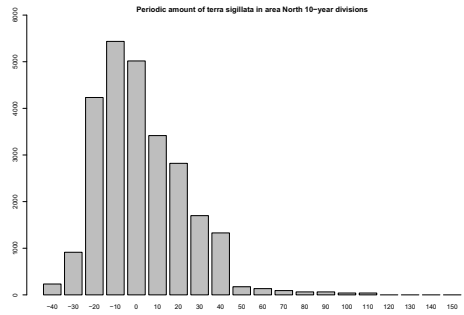
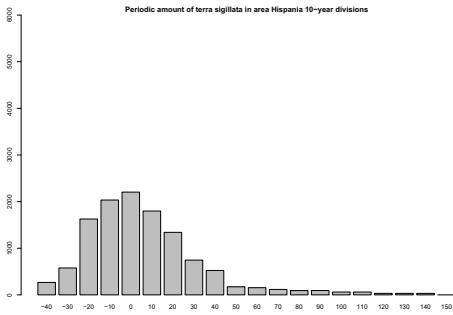
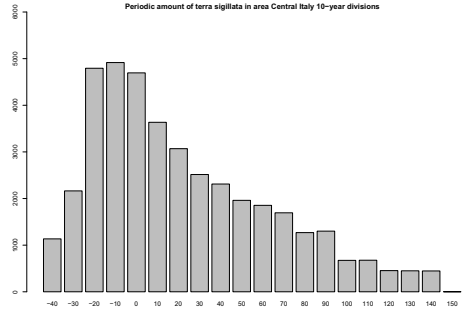
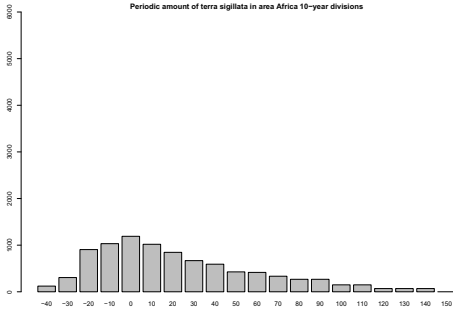


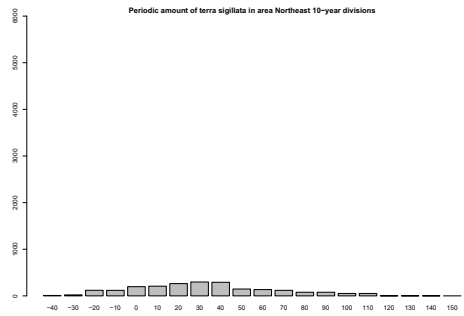
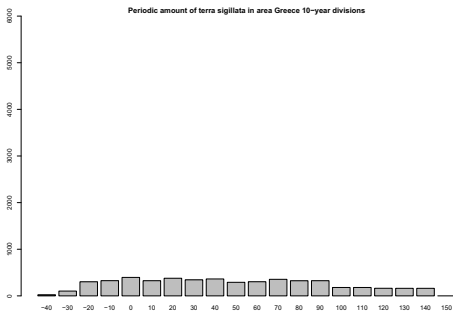
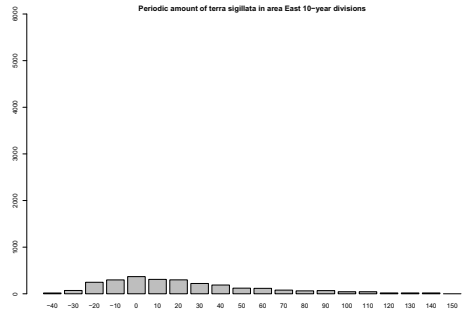
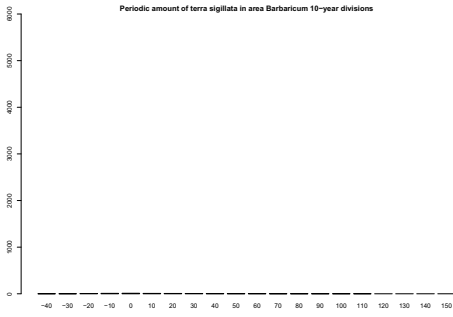


A. *Overall summaries*

- Africa
 - Africa Proconsularis
 - Mauretania Caesariensis
 - Mauretania Tingitania
 - Mauretania?
 - Melita
 - Numidia
- Barbaricum
 - The amounts in Barbaricum Australe, Orientale and Septent. are negligible, and these areas are left out of the analysis.
- East
 - Aegyptus
 - Arabia
 - Asia
 - Caria
 - Cilicia
 - Cyprus
 - Cyrene
 - Judaea
 - Lycia
 - Syria/Phoenike
- Greece
 - Achaea
 - Creta
 - Macedonia
- Hispania
 - Baleares
 - Hisp. Tarraconensis
 - Hispania Baetica
 - Lusitania
- Northwest
 - Aquitania
 - Britannia
 - Gallia Belgica
 - Gallia Lugdunensis
 - Gallia Narbonensis

- North
 - Germania Inferior
 - Germania Magna
 - Germania Superior
 - Noricum
 - Raetia
- Northeast
 - Dalmatia
 - Moesia Inferior
 - Moesia Superior
 - Pannonia Inferior
 - Pannonia Superior
- Northern Italy
 - Corsica
 - Italia, Aemilia
 - Italia, Liguria
 - Italia, Transpadana
 - Italia, Venetia
- Central Italy
 - Italia, Campania
 - Italia, Etruria
 - Italia, Latium
 - Italia, Picenum
 - Italia, Umbria
 - Sardinia
- Southern Italy
 - Italia, Apulia
 - Italia, Bruttium
 - Italia, Calabria
 - Italia, Lucania
 - Italia, Samnium
 - Italia, Sicilia





B

Tables

Table B.1: A list of all the potters known to be active at Arretium starting from 40 BCE, with the amount of finds bearing the stamp. From OCK²

Potter no.	Praenomen	Gentilicium	Cognomen	Amount
543			CHARITO	1
205			ANTIOCHVS	2
2259			TRYPHO	1
541			CHALINVS	2
1993			STEP(H)ANVS	4
958			HYLAS	1
1309			OCELLA	18
1828			SCAVRVS	3
911			HECT(OR)	2
1052			LVS()	1
1263			NICEPHORVS	2
910			HEC()	1
1464			PILA	22
51	Q.	AF()		17
91		AN()		10
212		ANTO()		2
726		DASSIVS		4
764		EP()		1
1031	C.	LIC()		5
1383	S(EX.)	PE()		67
1387		PERENNIVS		5
1430	L.	PETR(ONIVS)	CORIA	25
1490	L.	PO()		14
1593	P.	Q()		13
1696	L.	RAVIVS		11
1695		RAVIVS		3
1746	C.	S()		4
1744		S()		1
1833	C.	SE()		7

Table B.1: A list of all the potters known to be active at Arretium starting from 40 BCE, with the amount of finds bearing the stamp. From OCK²

Potter no.	Praenomen	Gentilicium	Cognomen	Amount
1834	C.	SE()		3
1925	A.	SE(STIVS ?)		2
1911	C.	SERTORIVS		33
1912	C.	SERTORIVS	OCELLA	73
1927	A.	SESTIVS		2
1924		SESTIVS	PILA	5
1946	A.	SESTIVS		1
1941	A.	SESTIVS		5
1929	A.	SESTIVS		2
1930	A.	SESTIVS		3
1933	A.	SESTIVS		1
1926	A.	SESTIVS		37
2044	L.	TE()	P()	3
2274	A.	V()		37
2272		V()		3
2275	C.	V()		12
2283		VA()		3
2404	A.	VIBIVS	SCROF(VLA)	5
2400	A.	VIBIVS	SCROFV(LA)	127
2490	L.	VM(BRICIVS)	SC(AVRVS)	1
2458	L.	VM(BRICIVS)		1
2478	L.	VMB(RICIVS)	SCAE(?)	4
2479	L.	VMB(RICIVS)	SCAR()	10
2460	L.	VMBRICIVS		4
2480	L.	VMBRICIVS	SCAVRVS	5
2491	L.	VMBRICIVS	SCAVRVS	4
2493	L.	VMBRICIVS	SEXTIO	7
2477	L.	VMBRICIVS	SCA()	15

Table B.2: A summary of the find positions of the selected potters within the Roman Etruria

<i>potter_no</i>	<i>findspot</i>	<i>count</i>
267	Arezzo	370
267	Ferento	1
267	Fiesole	1
268	Pisa	120
268	Luni	12
268	Cerveteri	1
268	Arezzo	1
268	Isola di Migliarino	1

Table B.2: A summary of the find positions of the selected potters within the Roman Etruria

<i>potter_no</i>	<i>findspot</i>	<i>count</i>
268	Orvieto	1
270	Luni	10
270	Chiusi	5
270	Firenze	3
270	Perugia	2
270	Arezzo	2
270	Bolsena	2
270	Fiesole	2
270	Coltano	1
270	Ferento	1
270	Isola di Migliarino	1
270	Pistoia	1
274	Arezzo	28
275	Arezzo	146
275	Luni	1
275	Fiesole	1
275	Settefinestre	1
276	Pisa	18
276	Luni	13
276	Bientina	1
276	Arezzo	1
278	Luni	10
278	Bientina	2
278	Arezzo	2
278	Ferento	2
278	Chiusi	1
278	Coltano	1
278	Isola di Migliarino	1
278	Livorno	1
278	Firenze	1
514	Arezzo	12
514	Ferento	4
514	Orvieto	3
514	Torrita di Siena	2
514	Fiesole	1
514	Cortona	1
514	Bolsena	1
514	Perugia	1
514	Luni	1
589	Arezzo	9
589	Bolsena	4
589	Chiusi	3
589	Ferento	2

Table B.2: A summary of the find positions of the selected potters within the Roman Etruria

<i>potter_no</i>	<i>findspot</i>	<i>count</i>
589	Perugia	2
589	Torrta di Siena	1
589	Firenze	1
623	Arezzo	67
623	Ferento	1
623	Chiusi	1
624	Arezzo	48
624	Chiusi	3
624	Perugia	2
624	Fiesole	1
624	Orvieto	1
624	Bolsena	1
624	Ferento	1
879	Arezzo	11
879	Bolsena	4
879	Ferento	3
879	Cortona	2
879	Chiusi	2
879	Monte Romano	1
879	Firenze	1
879	Montefiascone	1
879	Cerveteri	1
1099	Arezzo	10
1099	Ferento	7
1099	Chiusi	4
1099	Torrta di Siena	4
1099	Bolsena	2
1099	Perugia	1
1099	Siena	1
1137	Arezzo	16
1137	Fiesole	2
1137	Chiusi	1
1137	Firenze	1
1203	Arezzo	16
1203	Bolsena	2
1203	Perugia	1
1203	Chiusi	1
1203	Orvieto	1
1203	Ferento	1
1212	Luni	30
1212	Pisa	12
1212	Fiesole	10
1212	Bientina	6

Table B.2: A summary of the find positions of the selected potters within the Roman Etruria

<i>potter_no</i>	<i>findspot</i>	<i>count</i>
1212	Livorno	6
1212	Coltano	5
1212	Settefinestre	5
1212	Isola di Migliarino	5
1212	Pietrasanta	3
1212	Certaldo	1
1212	Cosa	1
1213	Luni	9
1213	Settefinestre	4
1213	Bientina	2
1213	Isola di Migliarino	2
1213	Perugia	1
1213	Coltano	1
1213	Firenze	1
1213	Fiesole	1
1287	Luni	13
1287	Certaldo	4
1287	Bientina	3
1287	Coltano	1
1287	Isola di Migliarino	1
1342	Luni	27
1342	Pisa	5
1342	Bientina	2
1342	Coltano	2
1342	Livorno	2
1342	Volterra	1
1342	Isola di Migliarino	1
1342	Fiesole	1
1342	Settefinestre	1
1390	Arezzo	75
1390	Saturnia	2
1390	Bolsena	2
1390	Chiusi	1
1390	Luni	1
1390	Ferento	1
1390	Sarteano	1
1391	Arezzo	65
1391	Chiusi	1
1391	Luni	1
1391	Ferento	1
1391	Fiesole	1
1404	Arezzo	24
1404	Saturnia	2

Table B.2: A summary of the find positions of the selected potters within the Roman Etruria

<i>potter_no</i>	<i>findspot</i>	<i>count</i>
1404	Luni	1
1404	Ferento	1
1404	Fiesole	1
1404	Orvieto	1
1408	Arezzo	17
1408	Chiusi	2
1408	Perugia	1
1412	Arezzo	43
1413	Arezzo	24
1414	Arezzo	22
1415	Arezzo	46
1622	Arezzo	19
1622	Fiesole	1
1622	Bolsena	1
1623	Arezzo	24
1623	Ferento	8
1623	Bolsena	5
1623	Orvieto	4
1623	Chiusi	4
1623	Vulci	3
1623	Firenze	2
1623	Fiesole	1
1623	Torrita di Siena	1
1623	Cortona	1
1623	Perugia	1
1623	Viterbo	1
1623	Castel d'Asso	1
1690	Luni	33
1690	Bientina	15
1690	Certaldo	8
1690	Isola di Migliarino	7
1690	Settefinestre	6
1690	Fiesole	4
1690	Pisa	4
1690	Livorno	3
1690	Coltano	2
1690	Pietrasanta	1
1690	Arezzo	1
1690	Volterra	1
1690	Chiusi	1
1690	Cosa	1
1708	Arezzo	20
2109	Arezzo	6

Table B.2: A summary of the find positions of the selected potters within the Roman Etruria

<i>potter_no</i>	<i>findspot</i>	<i>count</i>
2109	Chiusi	3
2109	Bolsena	3
2109	Luni	2
2109	Ferento	2
2109	Saturnia	1
2109	Orvieto	1
2109	Fiesole	1
2109	Firenze	1
2109	Siena	1
2109	Pistoia	1
2109	Veii	1
2203	Arezzo	19
2203	Bolsena	2
2203	Perugia	1
2203	Chiusi	1
2203	Ferento	1
2239	Arezzo	14
2239	Firenze	4
2239	Fiesole	2
2239	Perugia	1
2239	Tarquinia	1
2239	Chiusi	1
2246	Arezzo	28
2246	Luni	1
2246	Orvieto	1
2246	Bolsena	1
2246	Ferento	1
2441	Chiusi	6
2441	Ferento	6
2441	Arezzo	4
2441	Viterbo	3
2441	Tarquinia	1
2441	Cortona	1
2441	Bolsena	1
2441	Poggio Murella	1
2441	Firenze	1
2441	Fiesole	1
2447	Torrita di Siena	21
2447	Chiusi	5
2544	Luni	15
2544	Pisa	7
2544	Isola di Migliarino	4
2544	Livorno	2

B. Tables

Table B.2: A summary of the find positions of the selected potters within the Roman Etruria

<i>potter_no</i>	<i>findspot</i>	<i>count</i>
2544	Firenze	2

Table B.3: A summary of all the stamps used in the study. The Potters with 20 or more exemplars in Etruria. OCK².

Praenomen	Gentilicium	Cognomen	Location	Date	Amount
CN.	ATEIVS		Arezzo	15 – 5 BC	372
	ATEIVS		Arezzo	15 – 5 BC	149
	ATEIVS		Pisa	5 BC – AD 25	136
L.	RASINIVS	PISANVS	Pisa	AD 50 – 120	87
SEX.	M(VRRIVS)	FES(TVS)	Pisa	AD 60 – 150	84
M.	PERENNIVS		Arezzo	15 BC – AD 60	83
P.	CORNELIVS		Arezzo	5 BC – AD 40	69
M.	PERENNIVS		Arezzo	20 BC – AD 20	69
P.	CORNELIVS		Arezzo	5 BC – AD 40	57
	RASINIVS		Arezzo	15 BC – AD 40	56
M.	PERENNIVS	TIGRANVS	Arezzo	20 – 1 BC	46
(M.)	(PERENNIVS)	TIGRANVS	Arezzo	10 BC – AD 10	43
C.	P()	PI(SANVS)	Pisa	AD 50 – 100+	42
CN.	ATEIVS		Pisa	5 BC – AD 40+	33
L.	TITIVS	THYRSVS	Arezzo	20 BC – AD 10	32
(M.)	(PERENNIVS)	BARGATHES	Arezzo	AD 1 – 30?	30
		ZOILVS	Pisa	5 BC – AD 50+	30
	ATEIVS		Arezzo/Pisa/Lyon	15 BC – AD 30	30
	MANNEIVS		Arezzo	AD 30 – 70	29
CN.	ATEIVS		Arezzo/Pisa	Augustan?	28
	CAMVRIVS		Arezzo	AD 30 – 70	27
(C.)	(VMBRICIVS)	CORDVS	Torrta di Siena	AD 50+	26
L.	GELLIVS		Arezzo?	15 BC – AD 50	26
	VMBRICIVS		Arezzo?	10 BC – AD 50+	25
M.	PERENNIVS	TIGRANVS	Arezzo	15 BC+?	24
L.	TITIVS		Arezzo	15 BC – AD 30+	24
L.	TETTIVS	SAMIA	Arezzo	20 BC – AD 5	23

Table B.3: A summary of all the stamps used in the study. The Potters with 20 or more exemplars in Etruria. OCK².

Praenomen	Gentilicium	Cognomen	Location	Date	Amount
L.	TITIVS	COPO	Arezzo	20 – 10 BC	23
(M.)	(PERENNIVS)	(TIGRANVS)	Arezzo	15 BC+ ?	22
C.	MVRRIVS		Arezzo	AD 1 – 30+	22
C.	CLO(DIVS)	SABI(NVS)	Arezzo	2nd half of C1 AD	22
L.	NONIVS	FLOR(ENTIVS)	Pisa	1st half of C2 AD	22
CN.	ATEIVS		Arezzo/Pisa/Lyon	15 BC – AD 50+	21
	RASINIVS		Arezzo	15 BC – AD 15+	21
SEX.	M(VRRIVS)	P()	Pisa	AD 60 – 150	21
	MEMMIVS		Arezzo	20 BC – AD 10	20
		RODO	Arezzo	5 BC – AD 40	20
M.	PERENNIVS	CRESCENS	Arezzo	AD 30 – 60	20

C

Clustering trees

These graphs describe the clustering process of chapter 5.

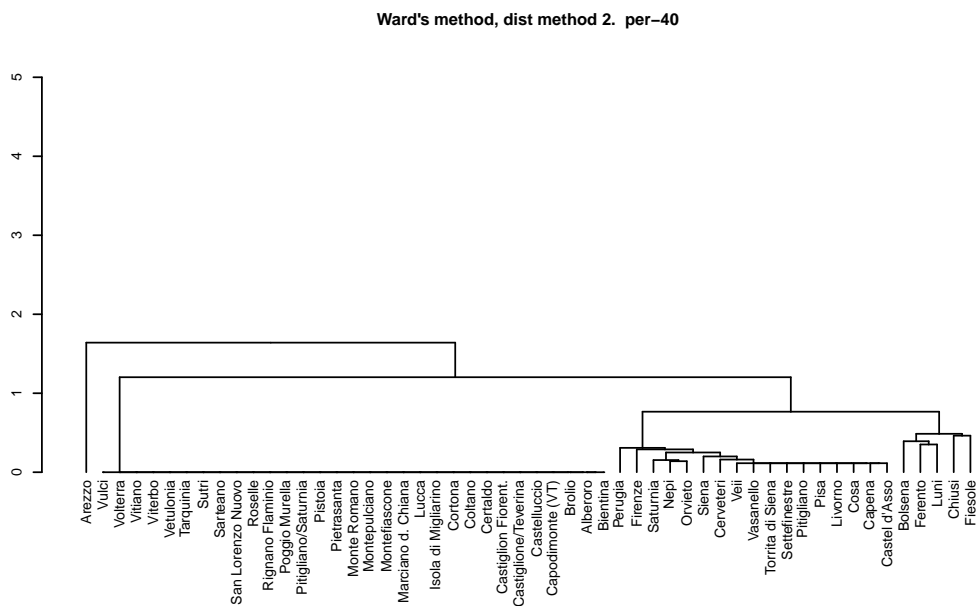


Figure C.1: Clustering tree of towns for period 'per-40'

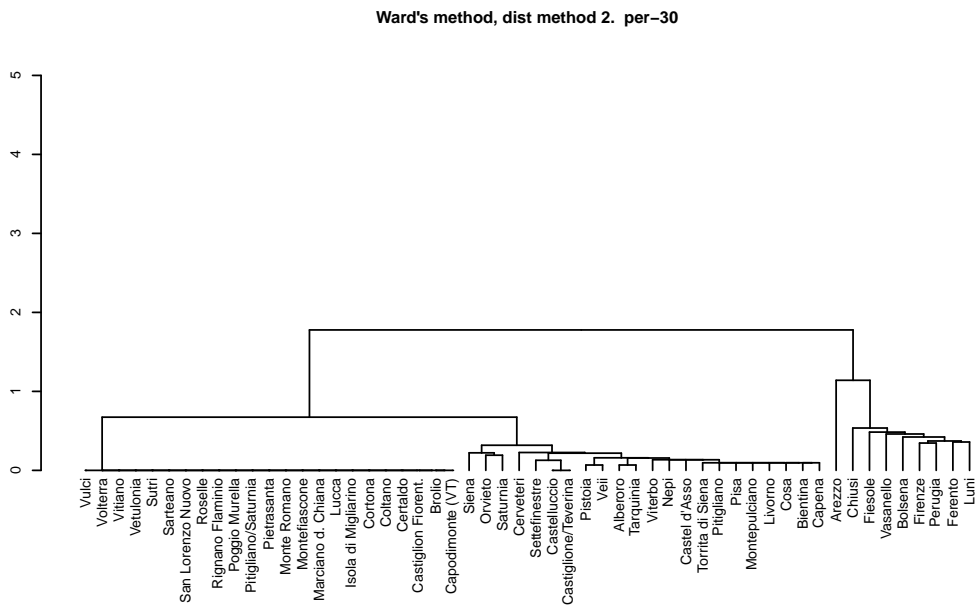


Figure C.2: Clustering tree of towns for period 'per-30'

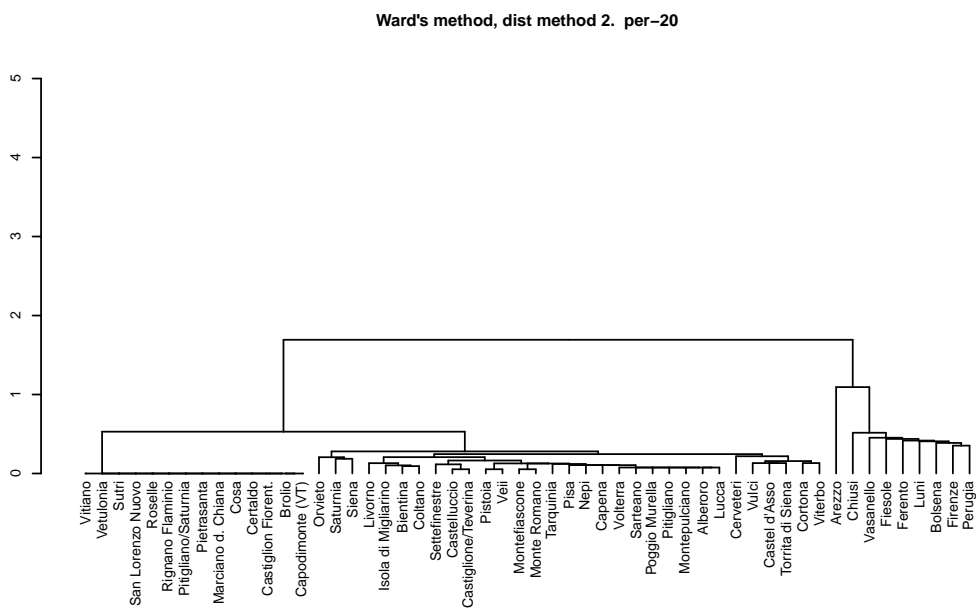
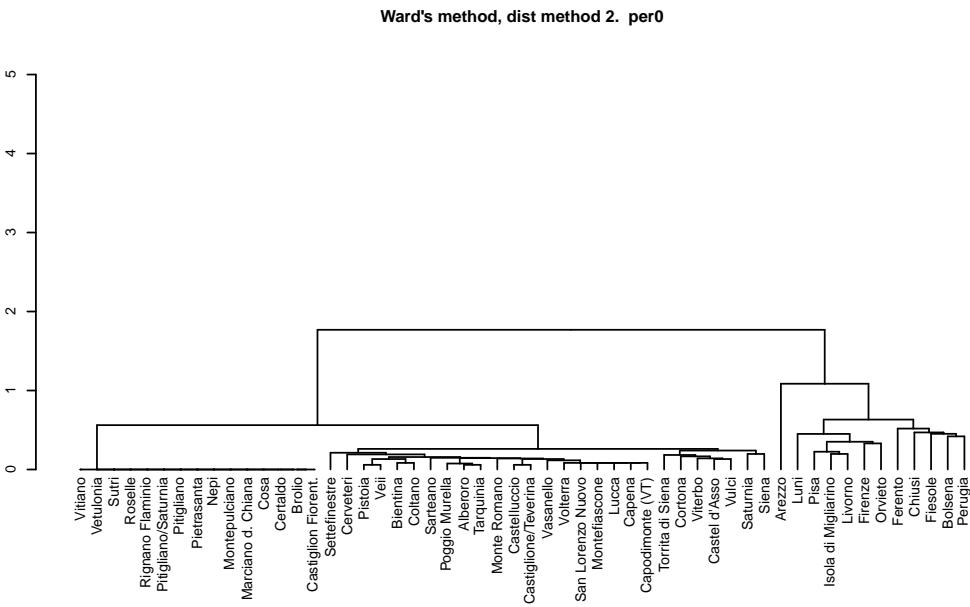
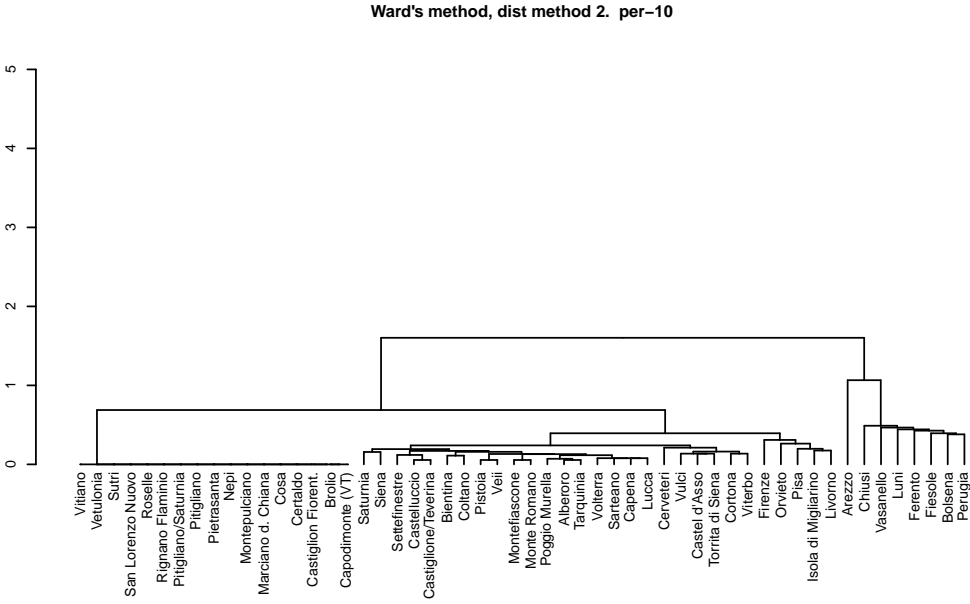


Figure C.3: Clustering tree of towns for period 'per-20'



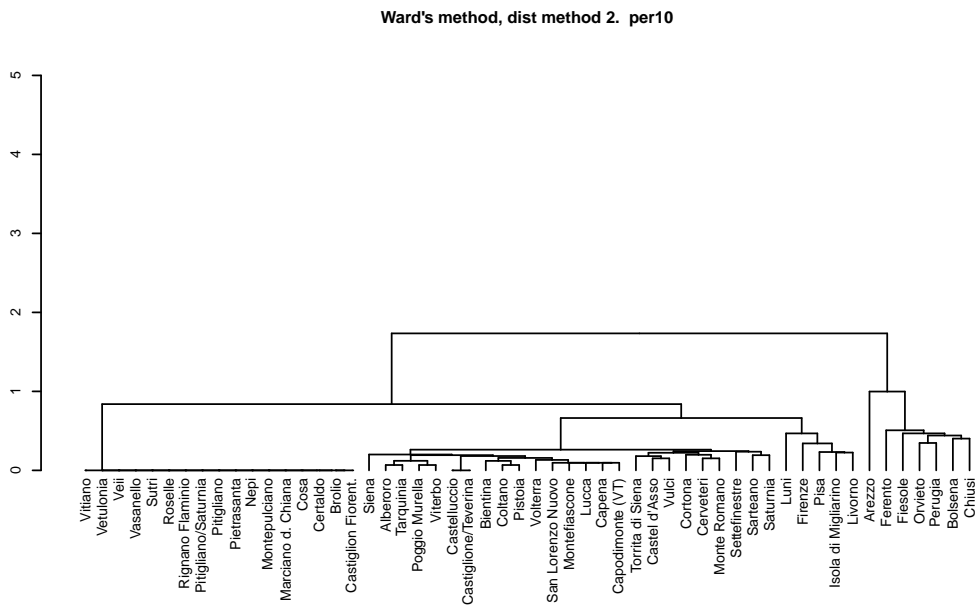


Figure C.6: Clustering tree of towns for period 'per10'

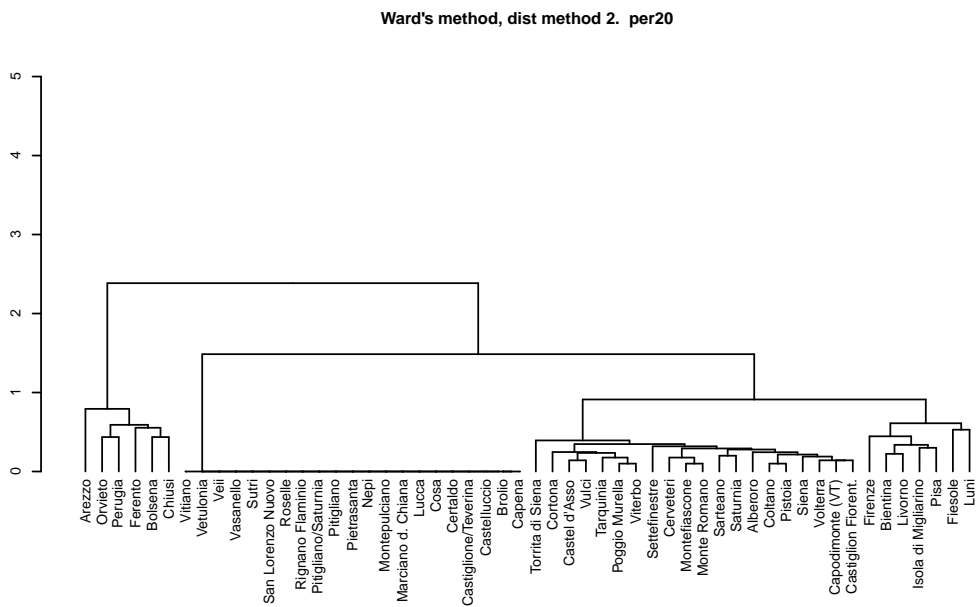


Figure C.7: Clustering tree of towns for period 'per20'

Ward's method, dist method 2. per30

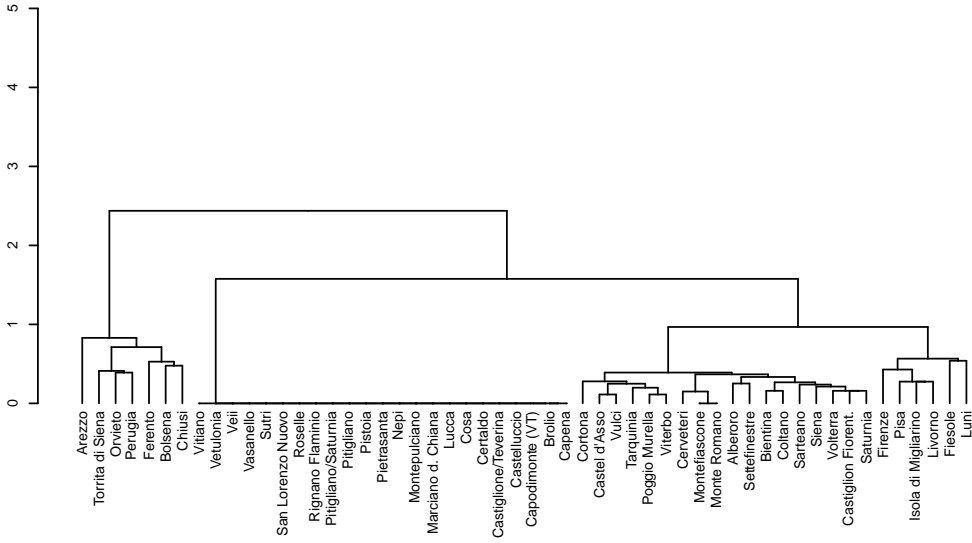


Figure C.8: Clustering tree of towns for period 'per30'

Ward's method, dist method 2. per40

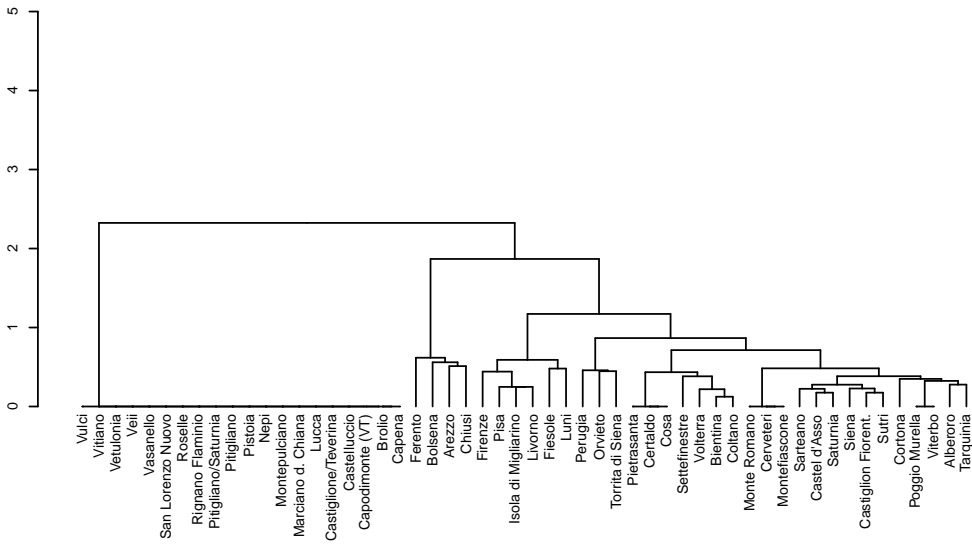


Figure C.9: Clustering tree of towns for period 'per40'

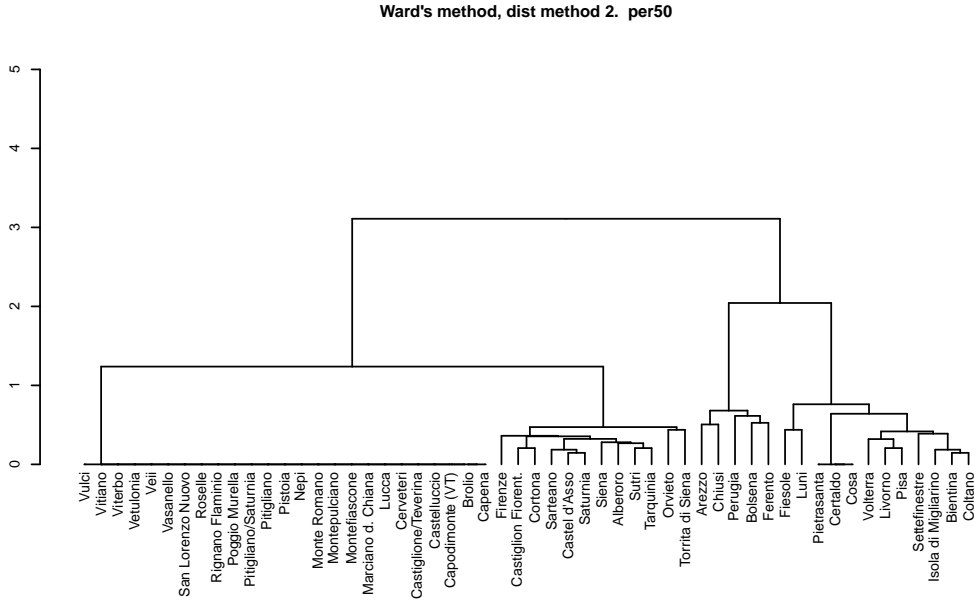


Figure C.10: Clustering tree of towns for period 'per50'

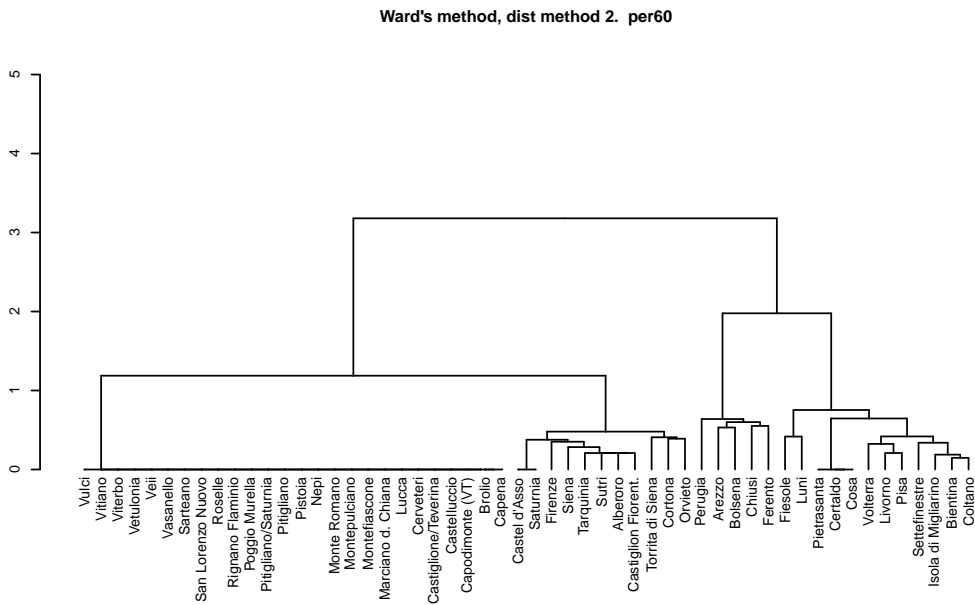


Figure C.11: Clustering tree of towns for period 'per60'

Ward's method, dist method 2. per70

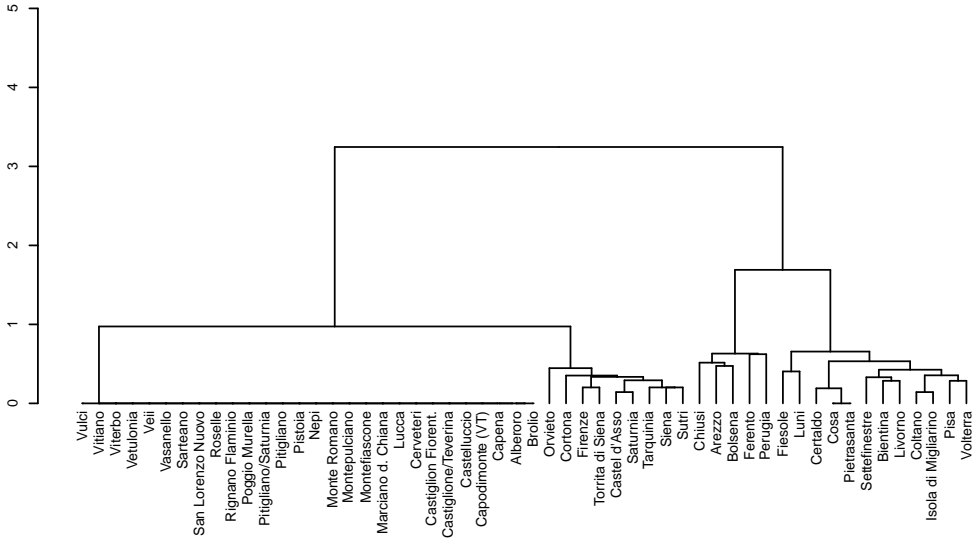


Figure C.12: Clustering tree of towns for period 'per70'

Ward's method, dist method 2. per80

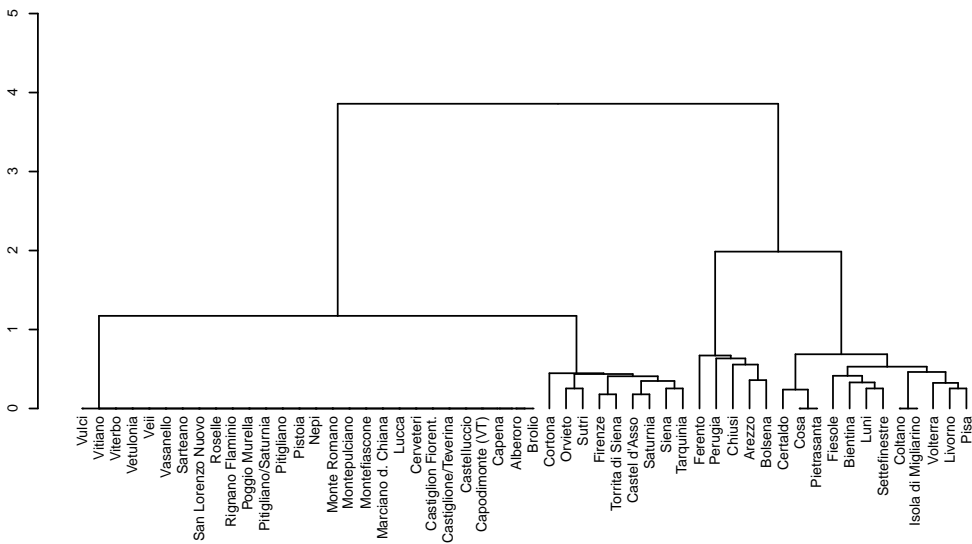


Figure C.13: Clustering tree of towns for period 'per80'

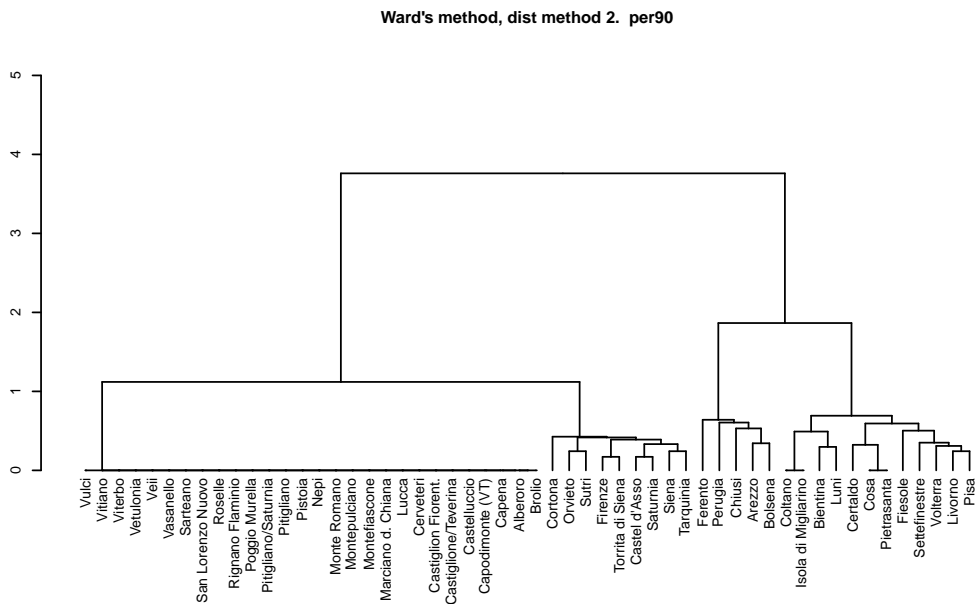


Figure C.14: Clustering tree of towns for period 'per90'

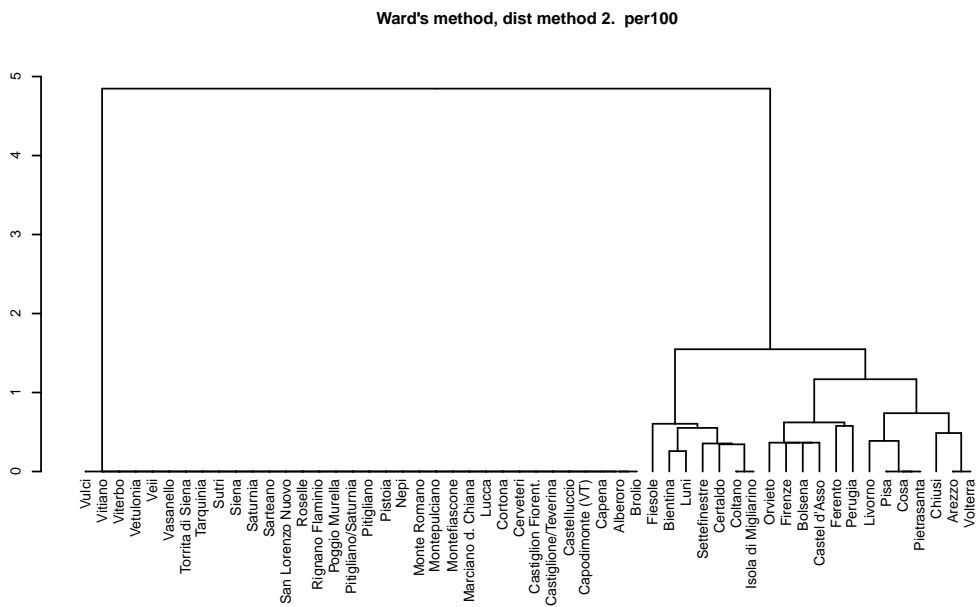


Figure C.15: Clustering tree of towns for period 'per100'

Ward's method, dist method 2. per110

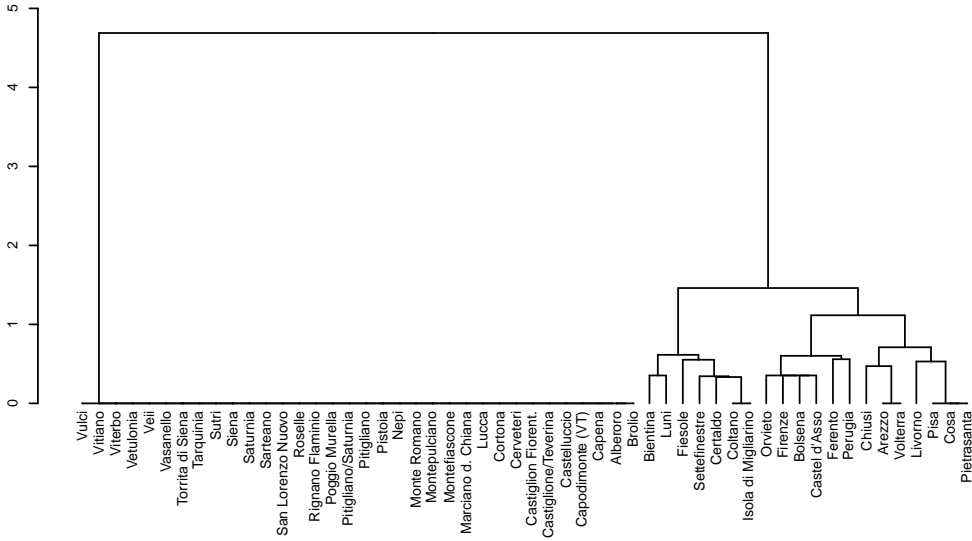


Figure C.16: Clustering tree of towns for period 'per110'

Ward's method, dist method 2. per120

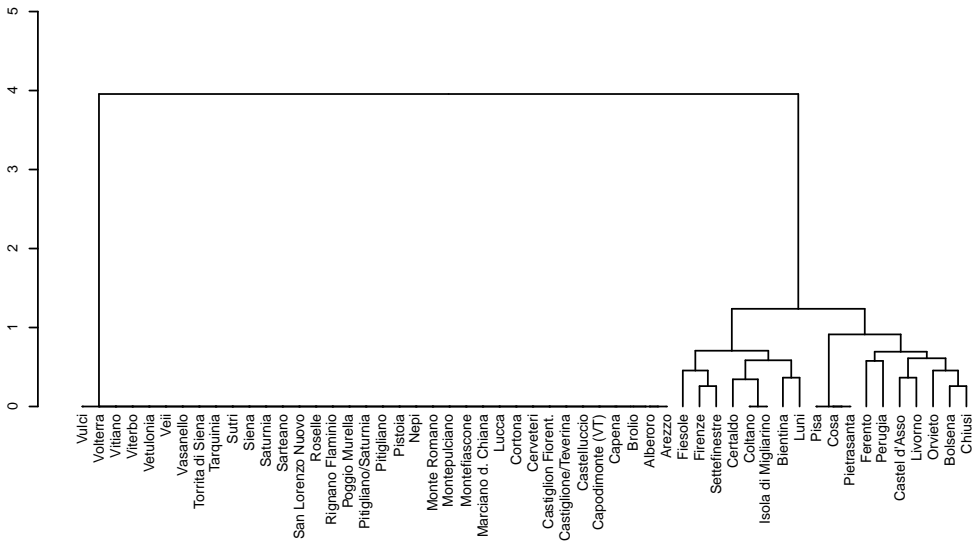


Figure C.17: Clustering tree of towns for period 'per120'

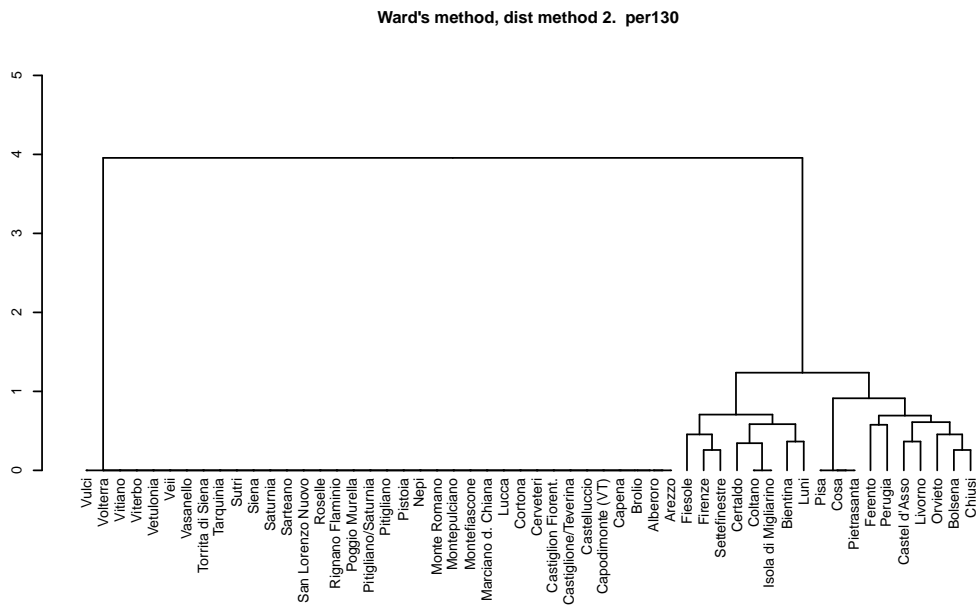


Figure C.18: Clustering tree of towns for period 'per130'

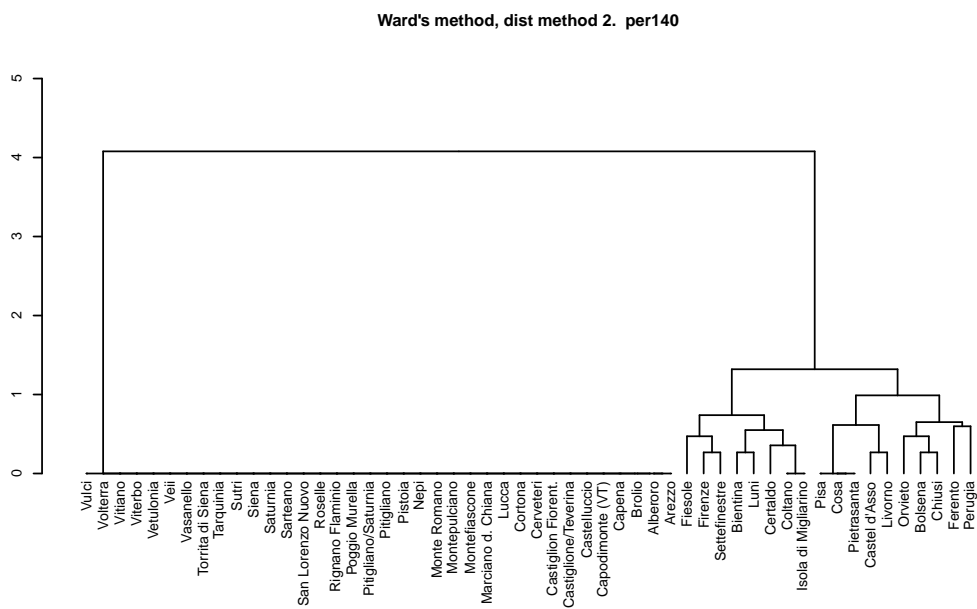


Figure C.19: Clustering tree of towns for period 'per140'

D

Groups resulting from clustering

On these maps, the groups resulting from the cluster analysis made in the chapter 5. The different groups are marked with different symbols, and the corresponding data is in the table 5 on page 112.

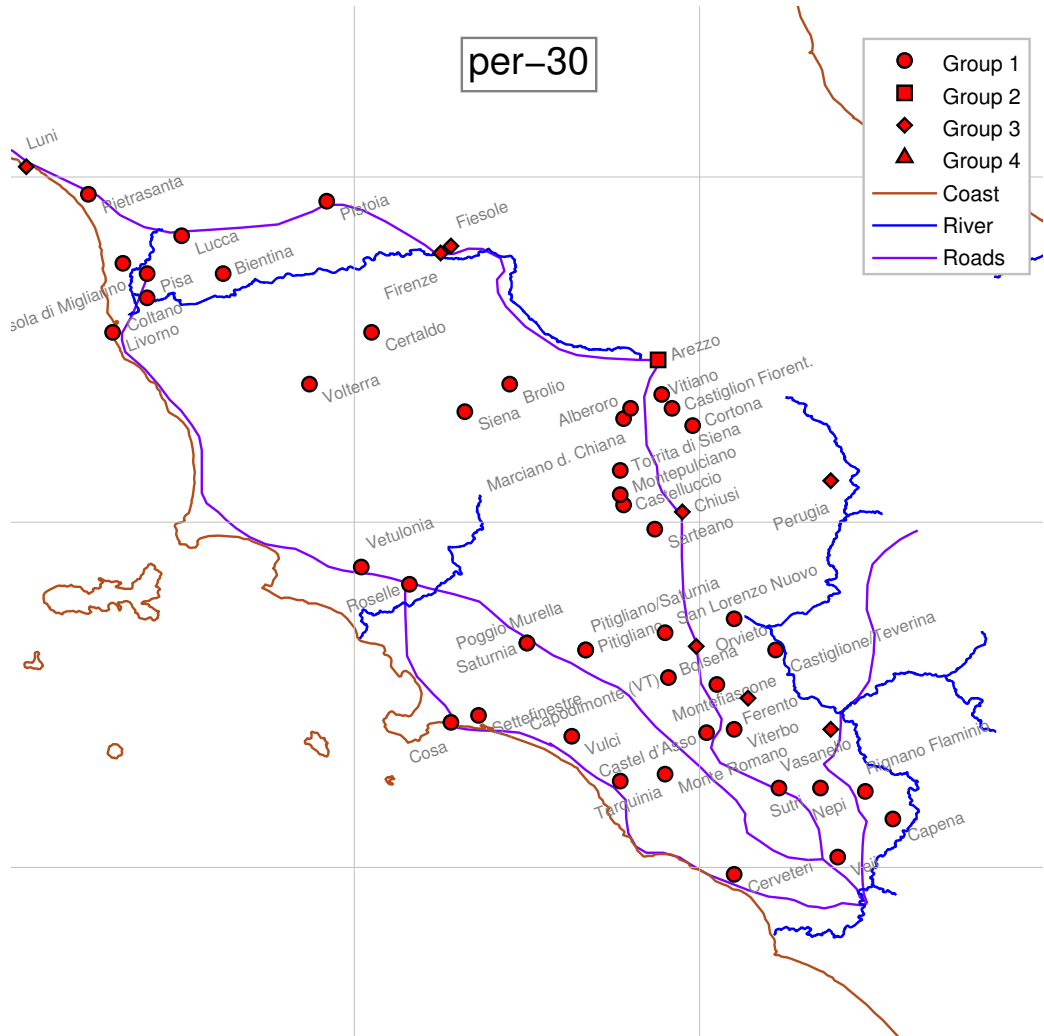


Figure D.2: Grouping of towns for period "per-30"

D. Groups resulting from clustering

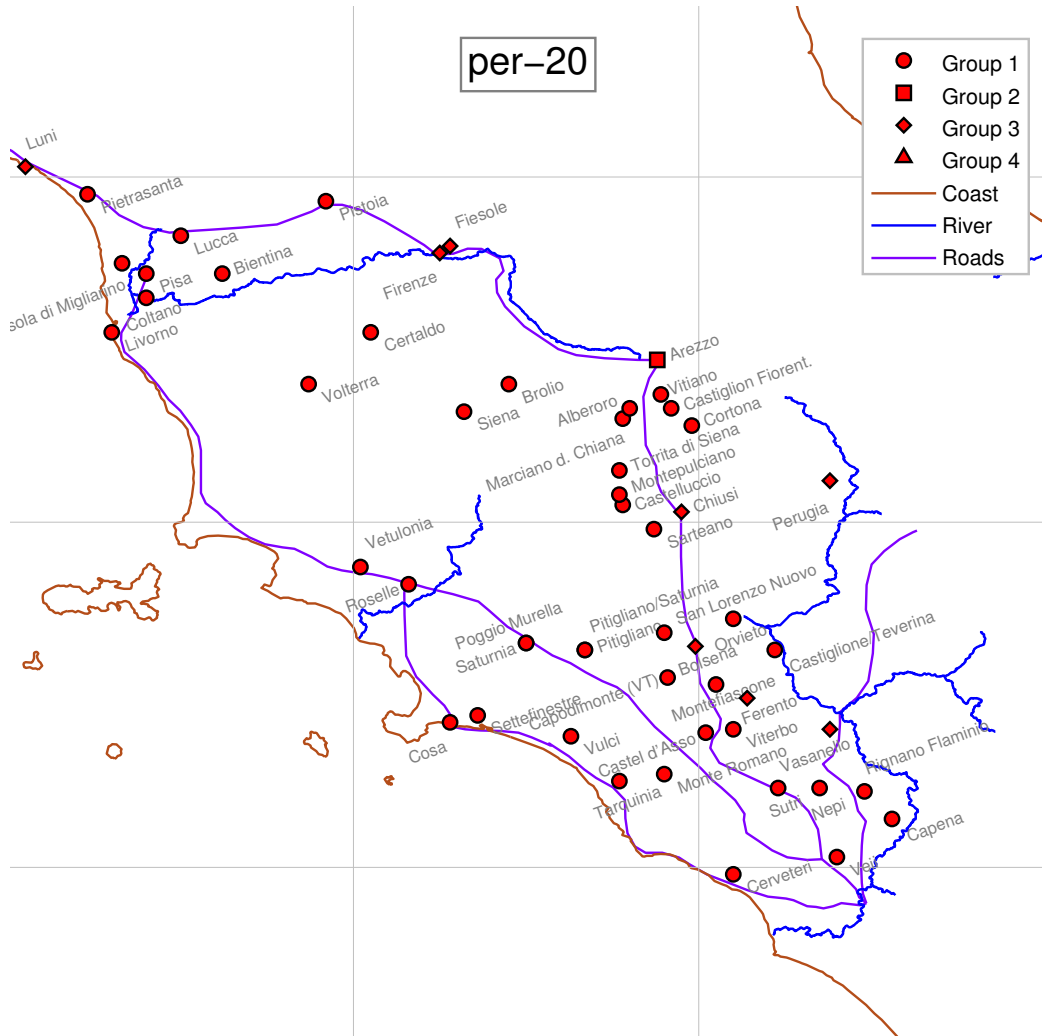


Figure D.3: Grouping of towns for period "per-20"

D. Groups resulting from clustering

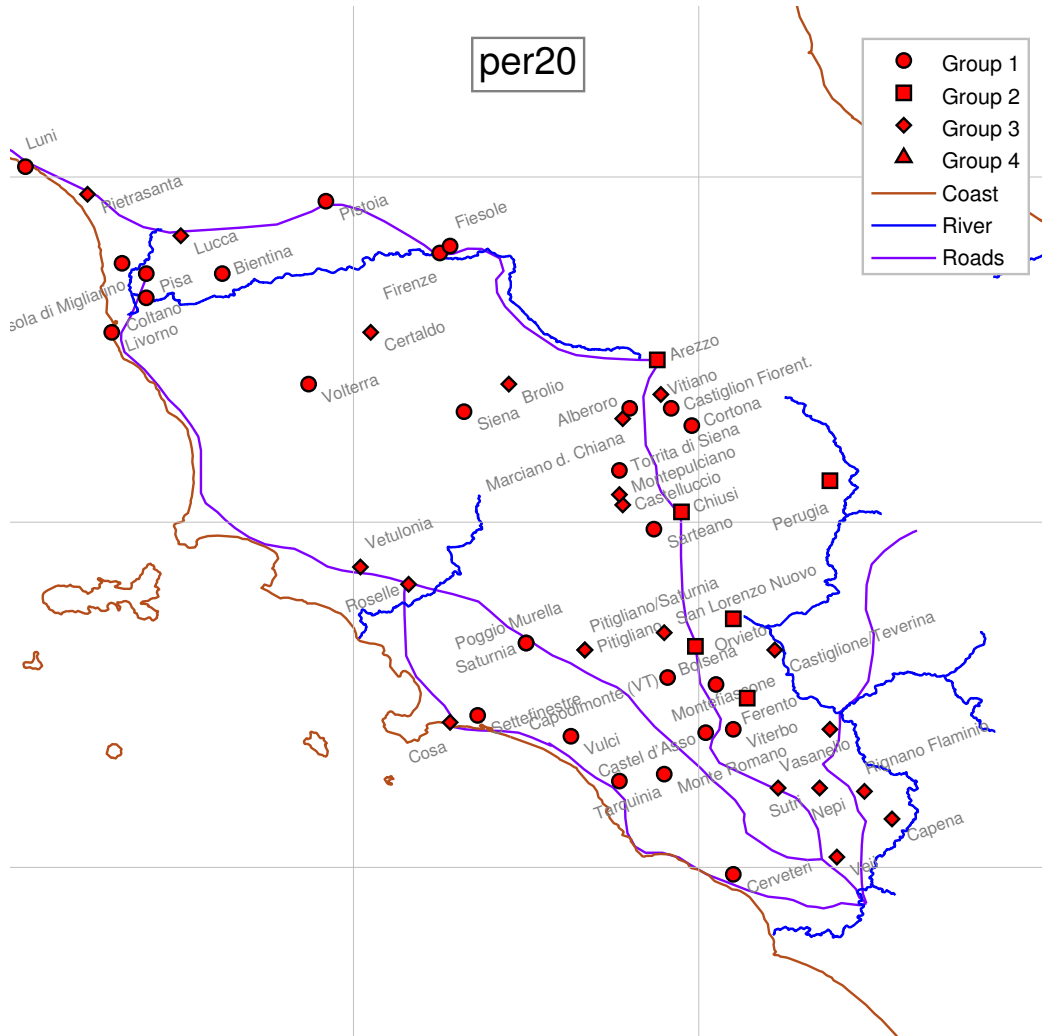


Figure D.7: Grouping of towns for period "per20"

D. Groups resulting from clustering

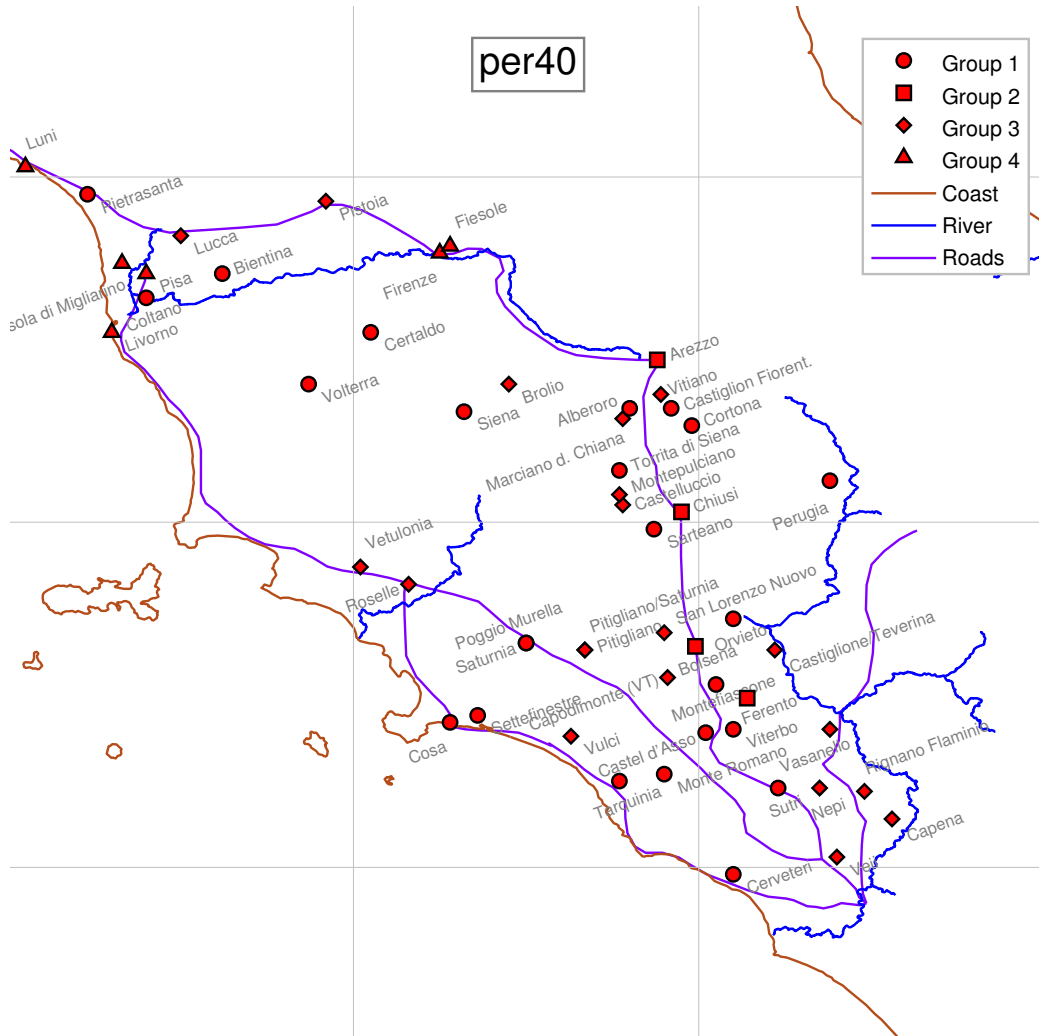


Figure D.9: Grouping of towns for period "per40"

D. Groups resulting from clustering

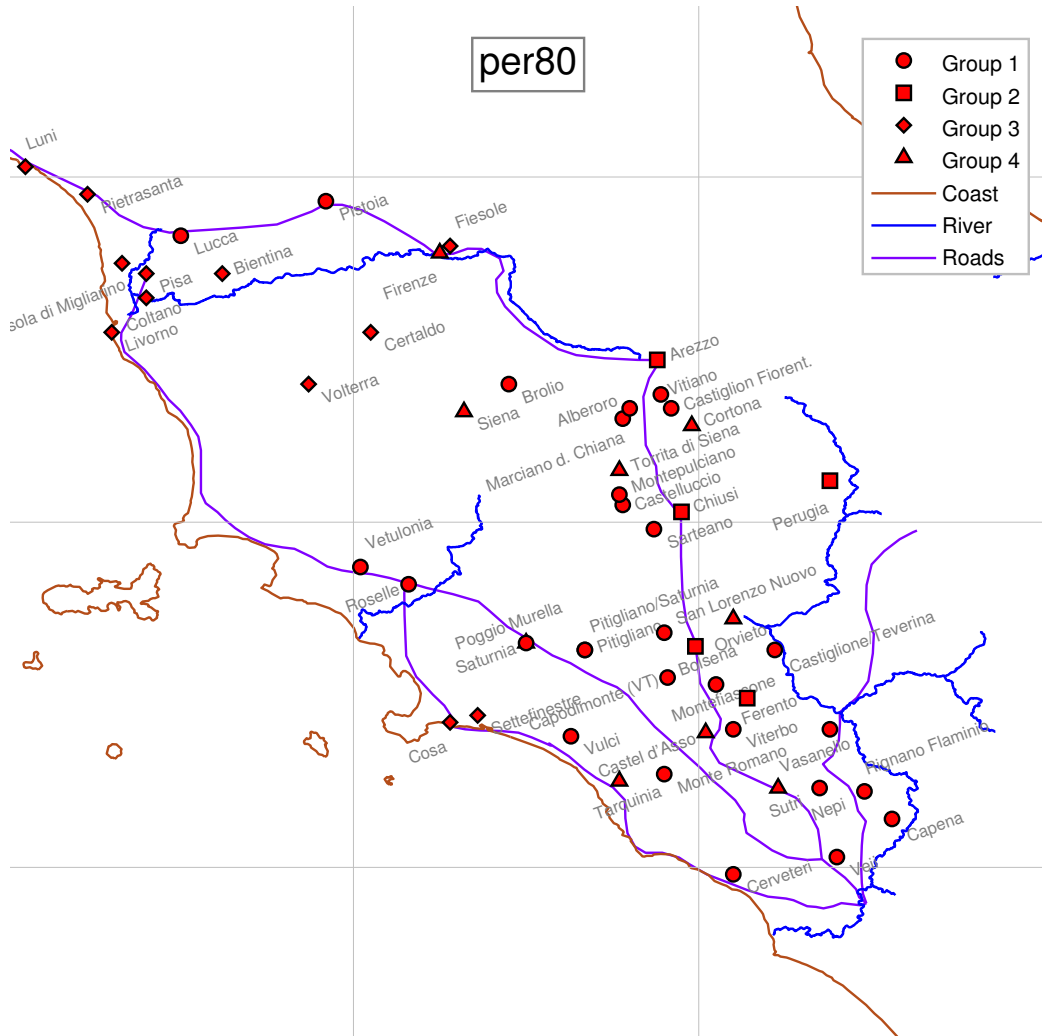


Figure D.13: Grouping of towns for period "per80"

D. Groups resulting from clustering

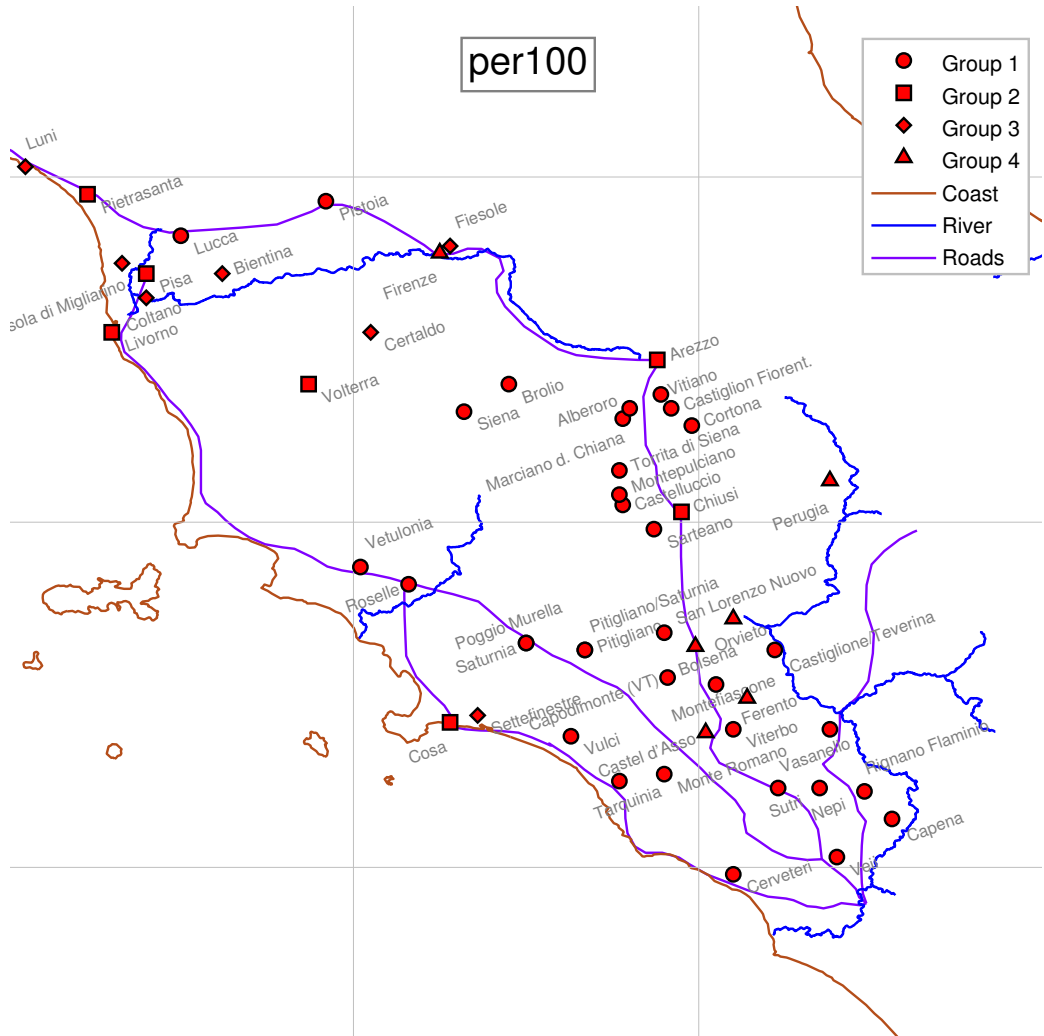


Figure D.15: Grouping of towns for period "per100"

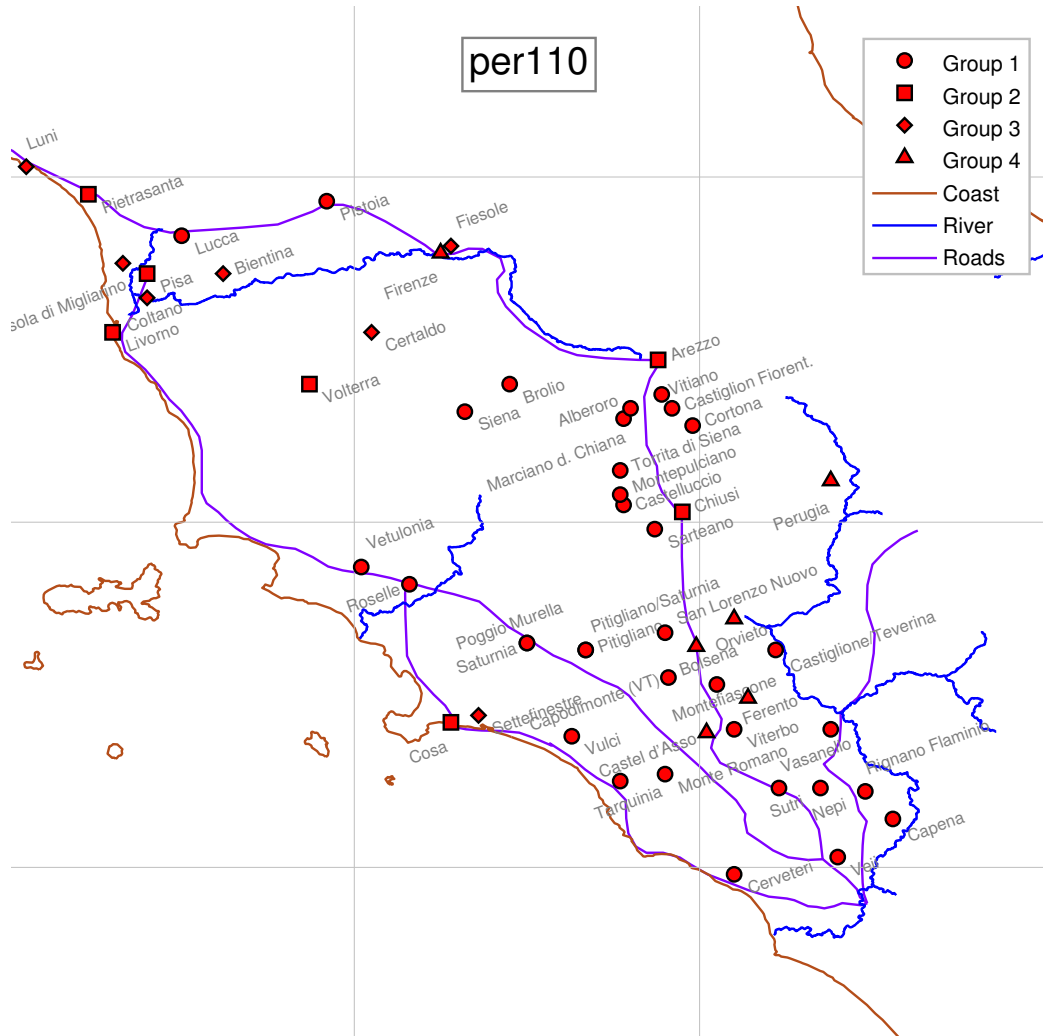


Figure D.16: Grouping of towns for period "per110"

D. Groups resulting from clustering

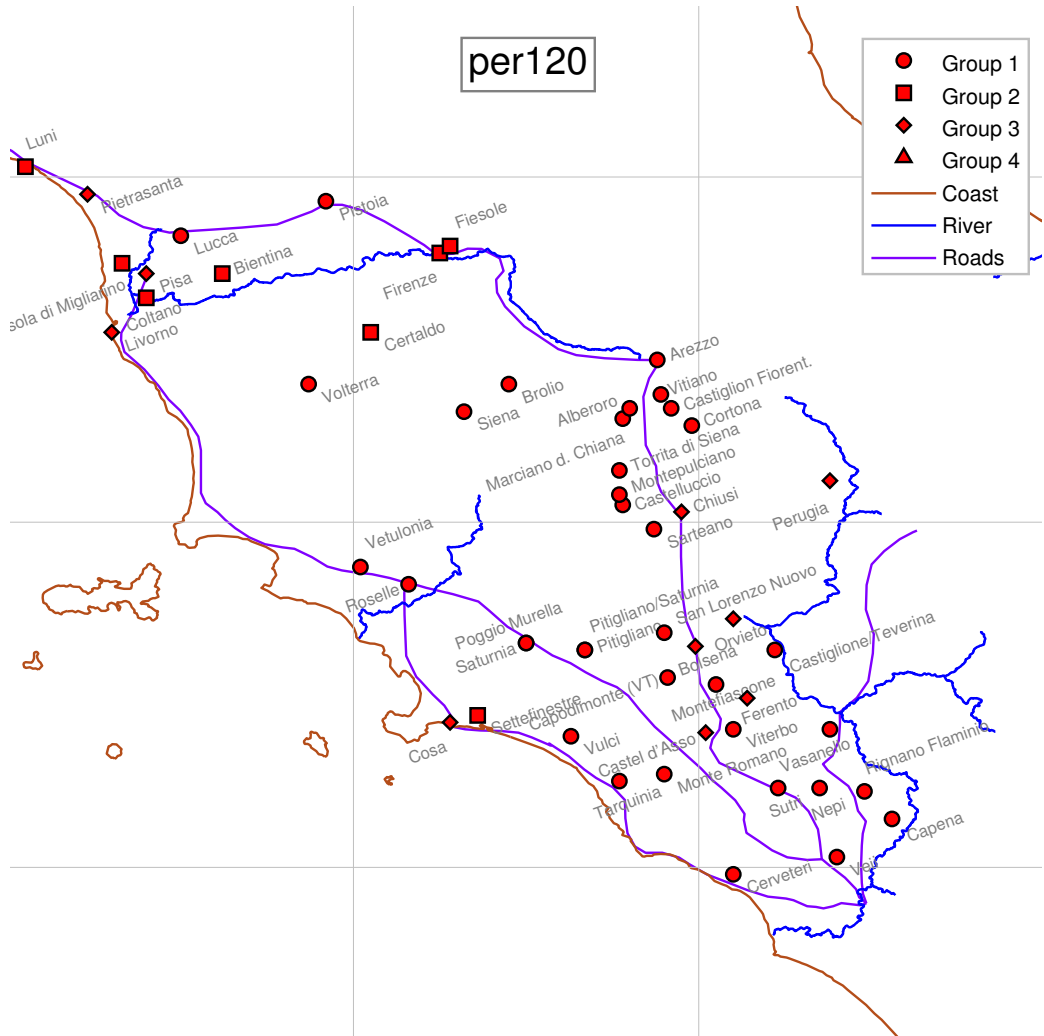


Figure D.17: Grouping of towns for period "per120"

E

Distribution maps of selected potters in Etruria

E. Distribution maps of selected potters in Etruria

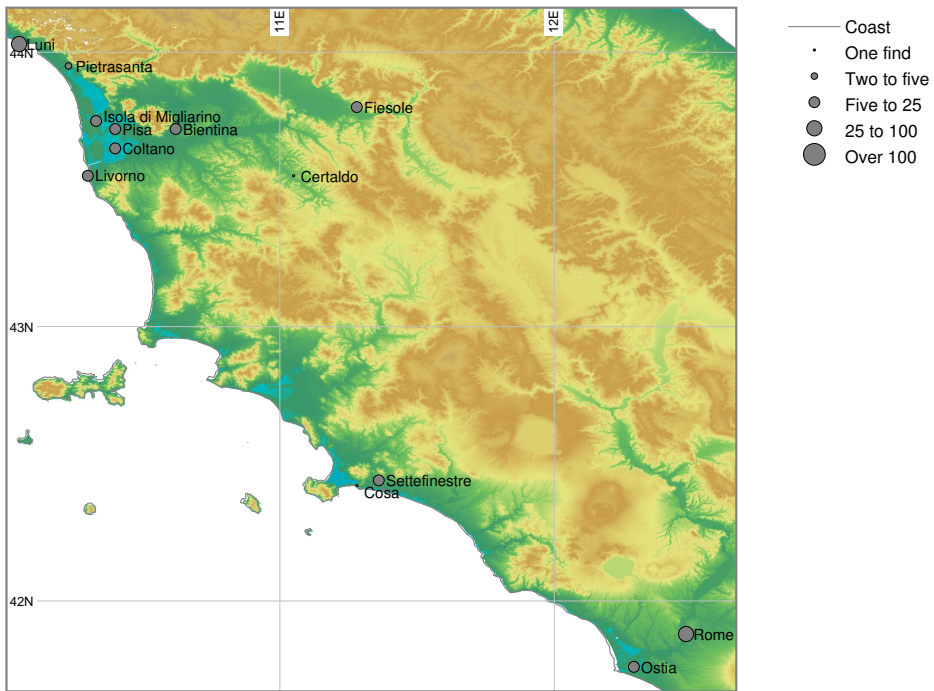


Figure E.1: The distribution map for potter 1212 in Etruria

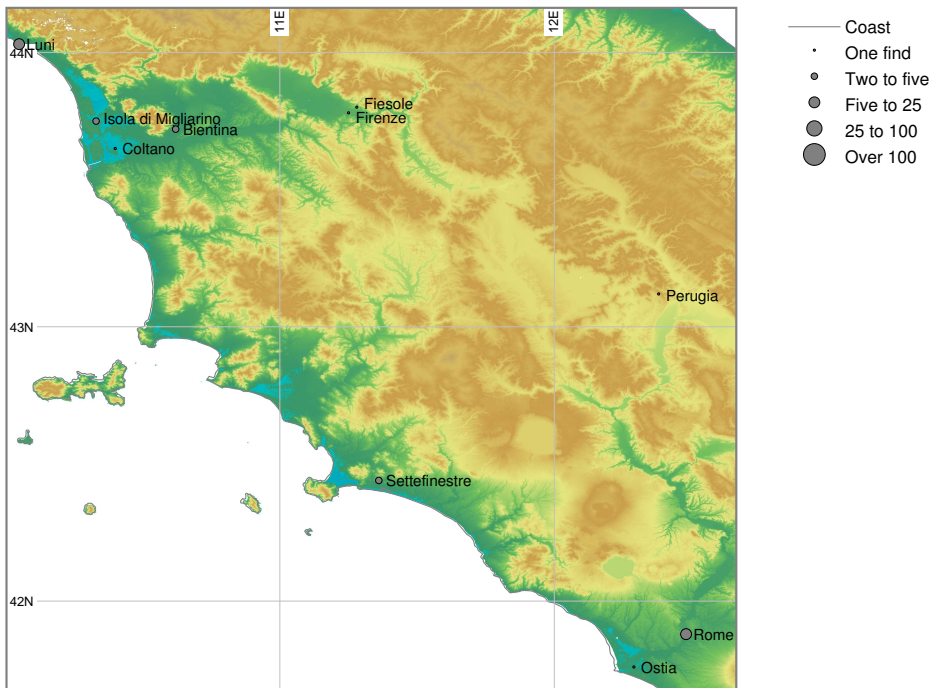


Figure E.2: The distribution map for potter 1213 in Etruria

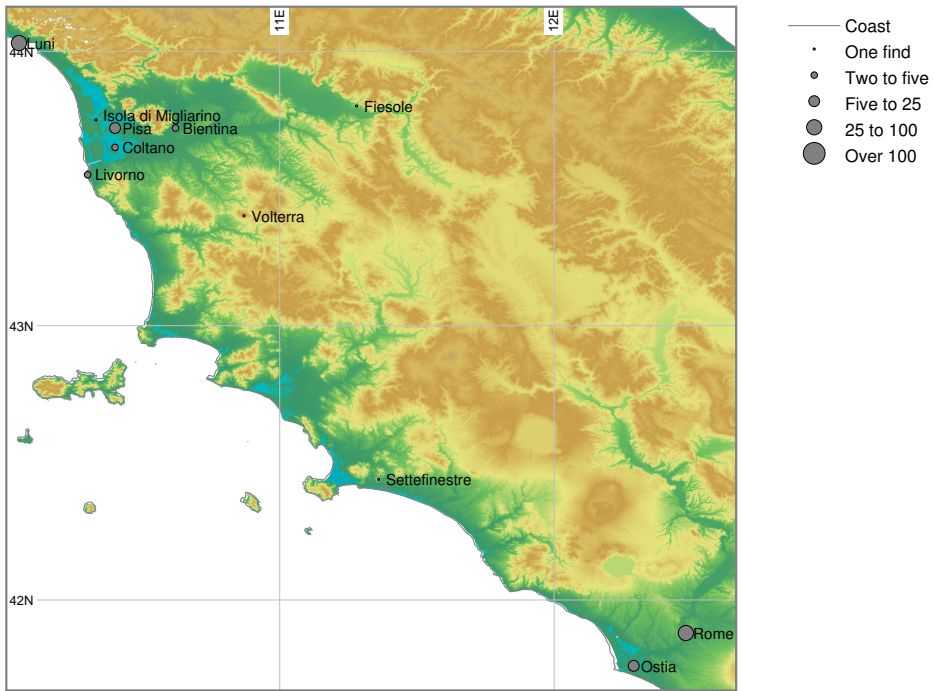


Figure E.3: The distribution map for potter 1342 in Etruria

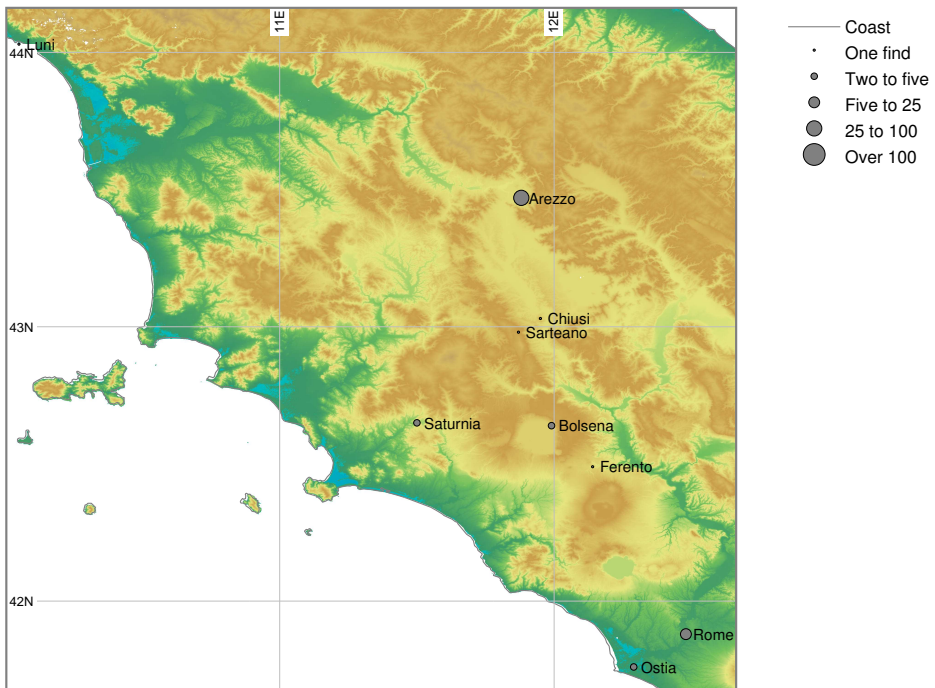


Figure E.4: The distribution map for potter 1390 in Etruria

E. Distribution maps of selected potters in Etruria

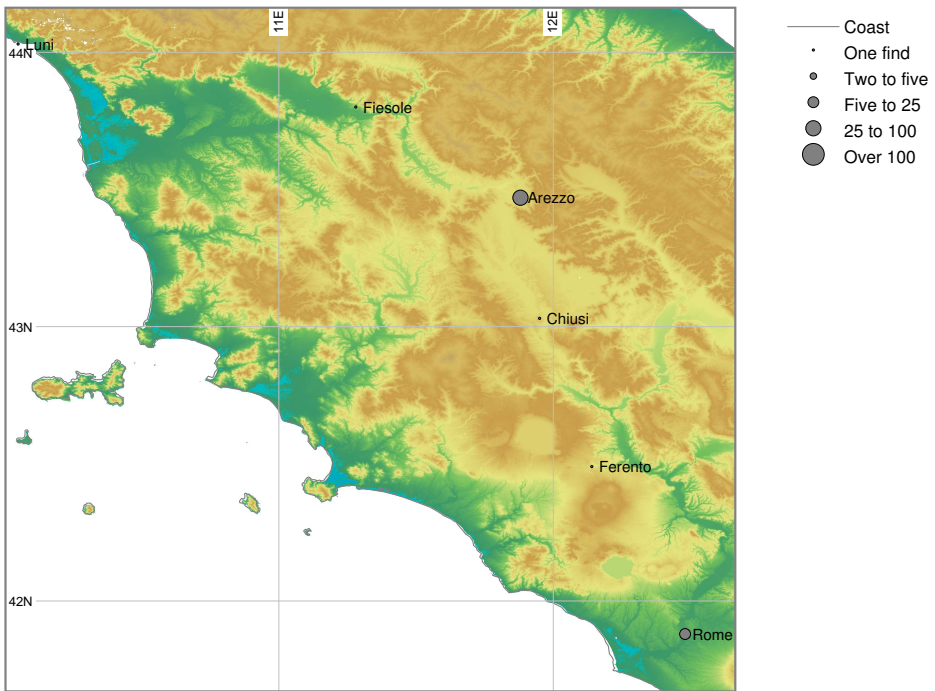


Figure E.5: The distribution map for potter 1391 in Etruria

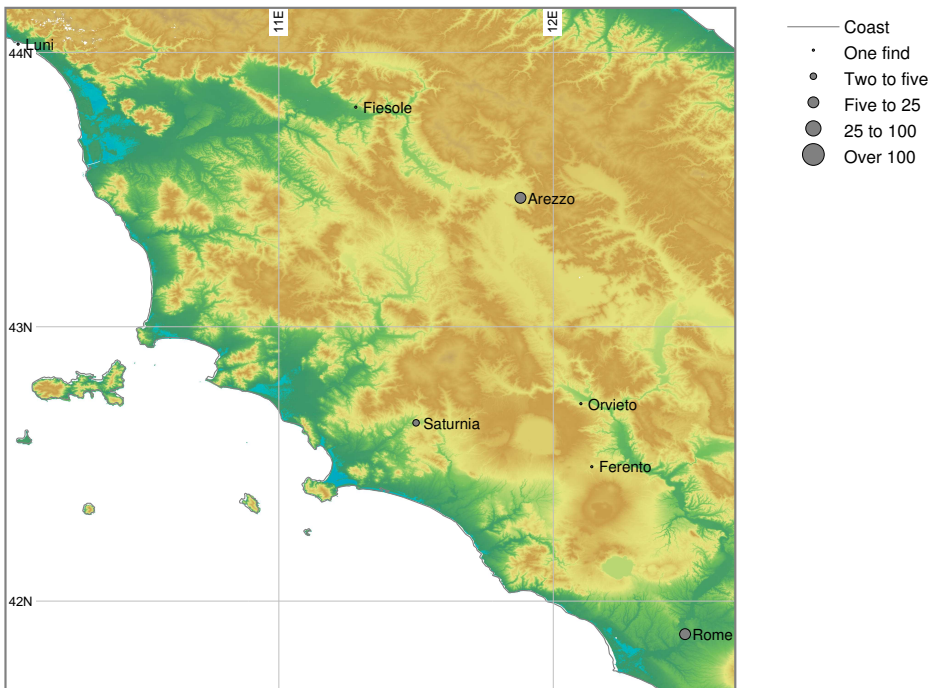


Figure E.6: The distribution map for potter 1404 in Etruria

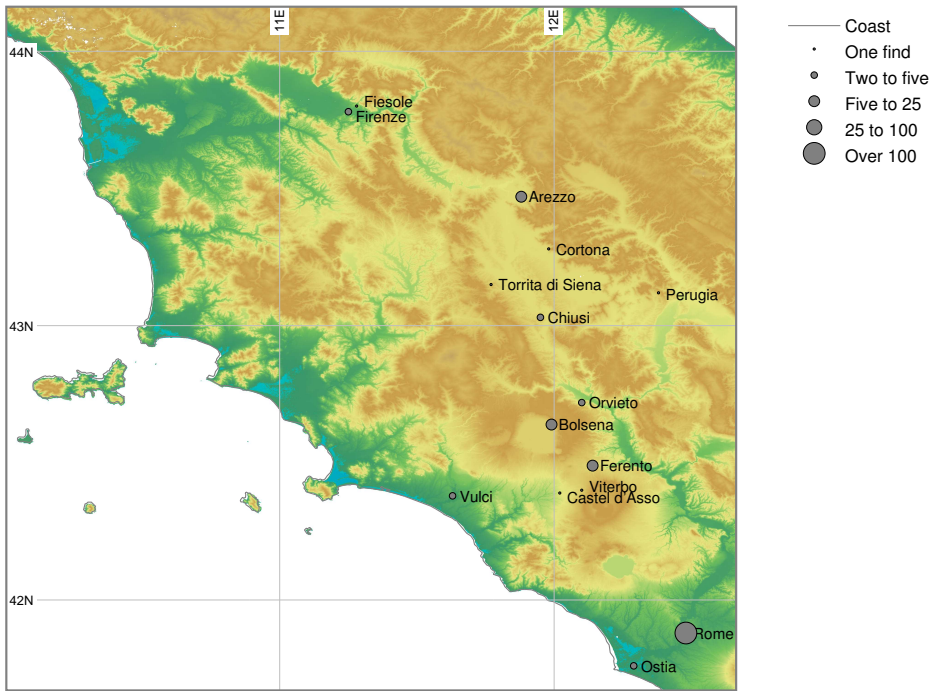


Figure E.7: The distribution map for potter 1623 in Etruria

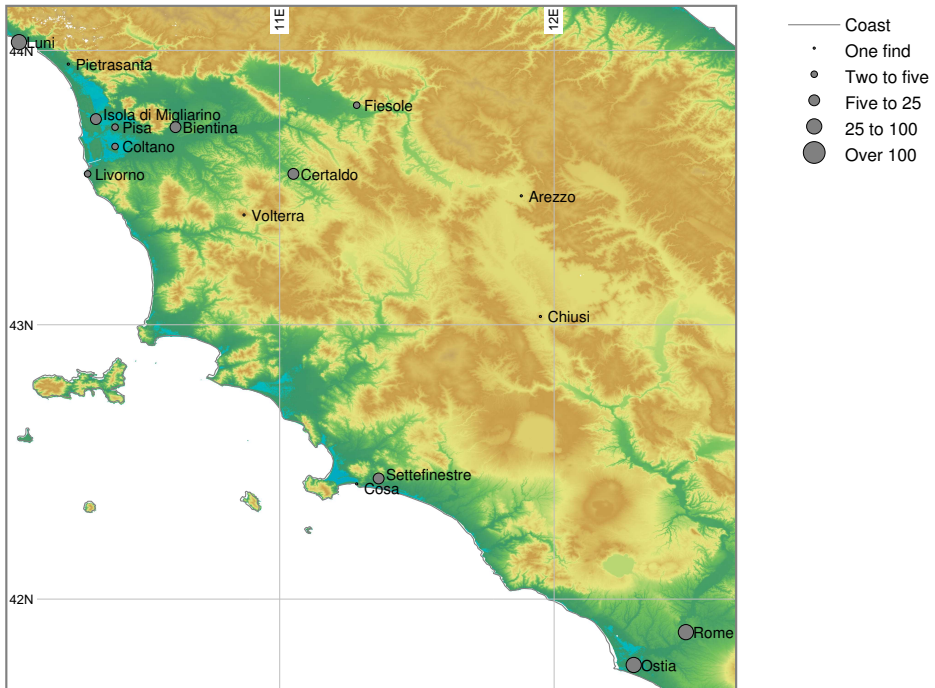


Figure E.8: The distribution map for potter 1690 in Etruria

E. Distribution maps of selected potters in Etruria

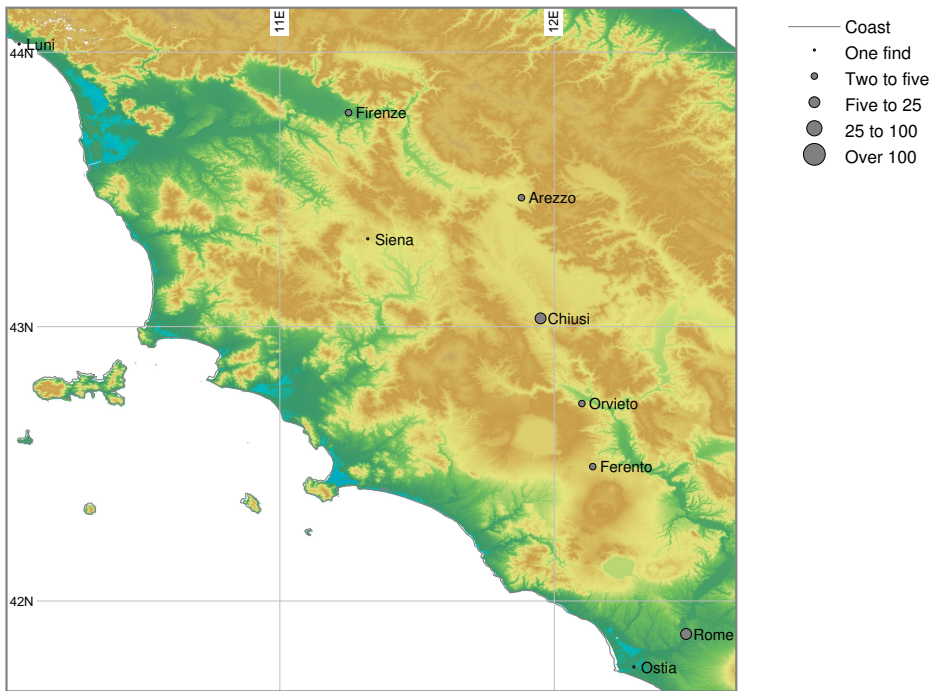


Figure E.9: The distribution map for potter 183 in Etruria

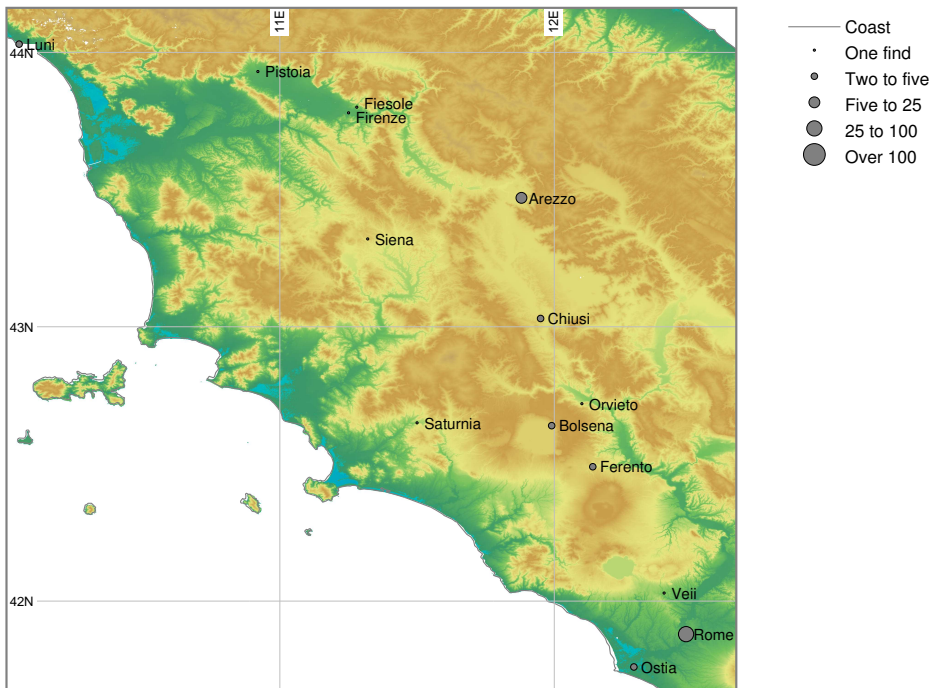


Figure E.10: The distribution map for potter 2109 in Etruria

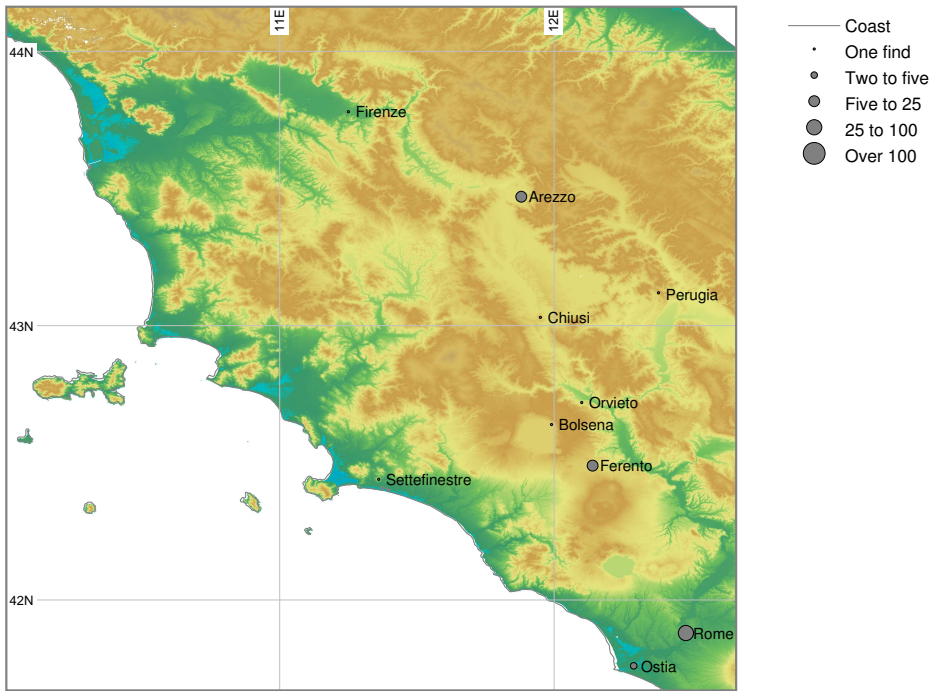


Figure E.11: The distribution map for potter 2373 in Etruria

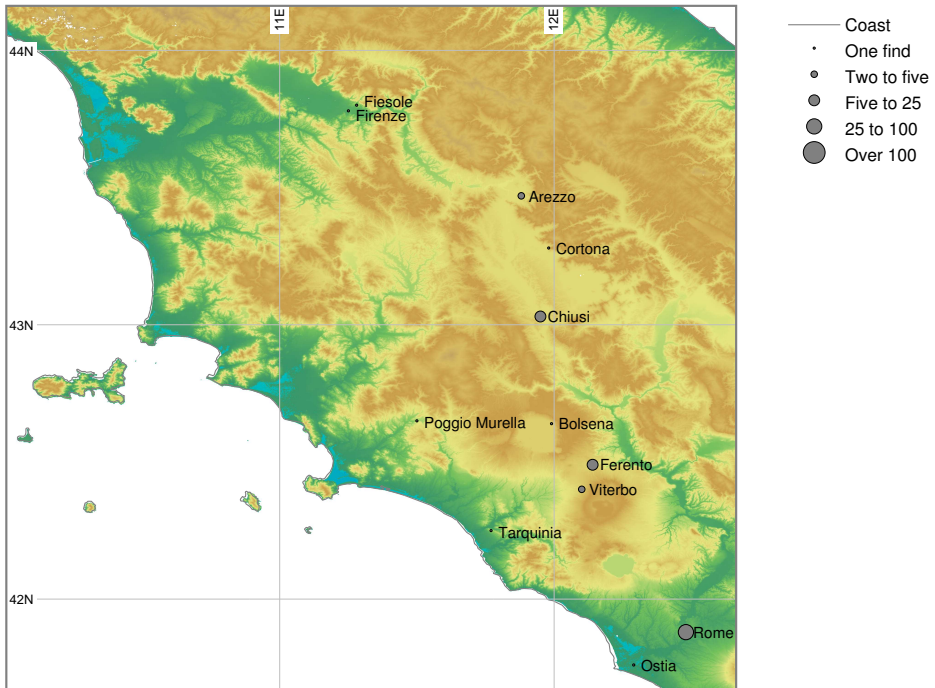


Figure E.12: The distribution map for potter 2441 in Etruria

E. Distribution maps of selected potters in Etruria

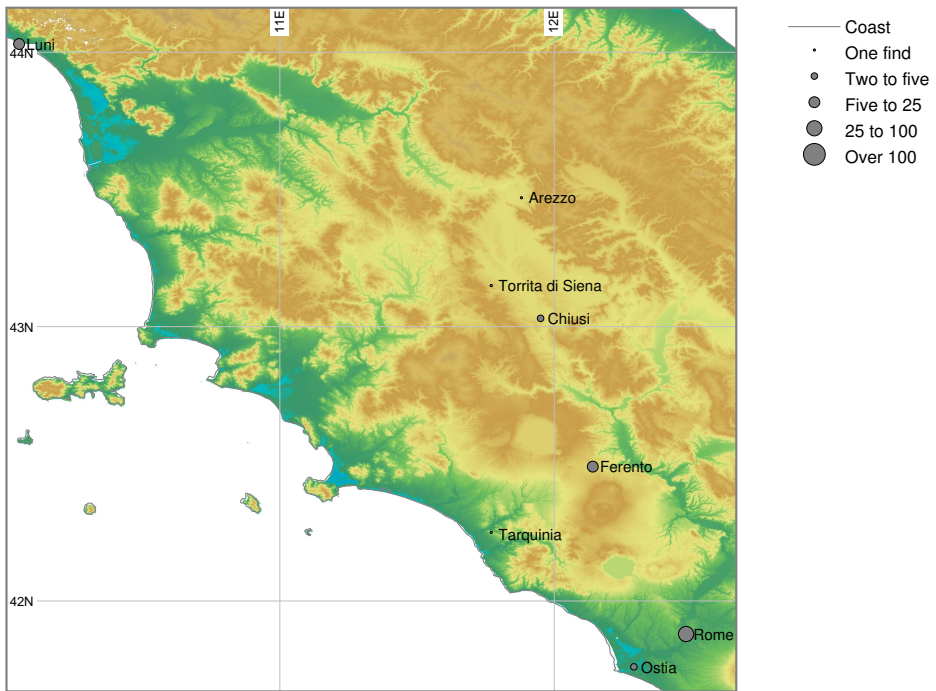


Figure E.13: The distribution map for potter 2585 in Etruria

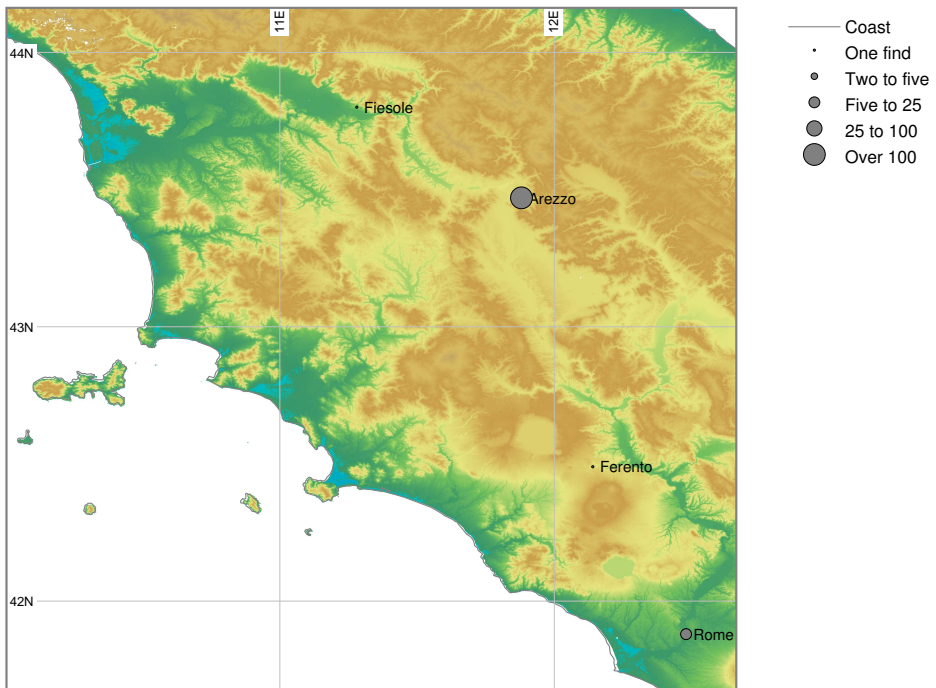


Figure E.14: The distribution map for potter 267 in Etruria

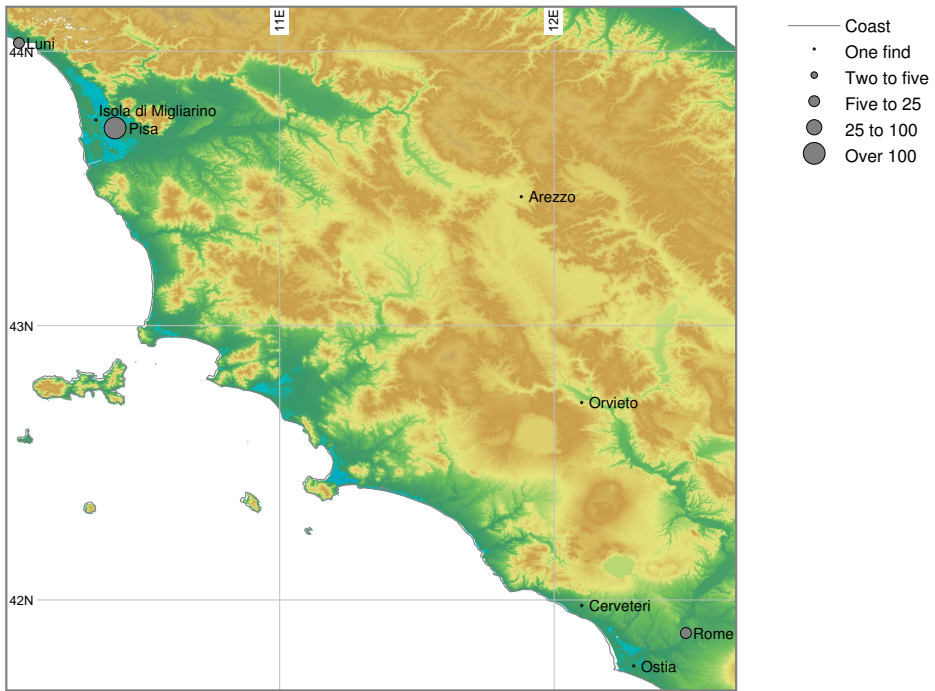


Figure E.15: The distribution map for potter 268 in Etruria

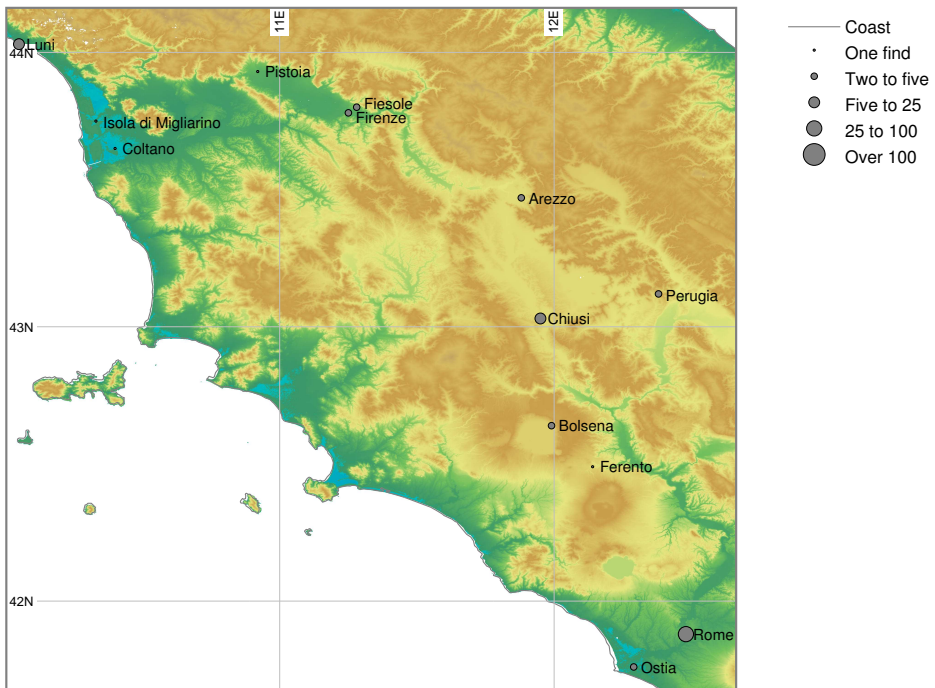


Figure E.16: The distribution map for potter 270 in Etruria

E. Distribution maps of selected potters in Etruria

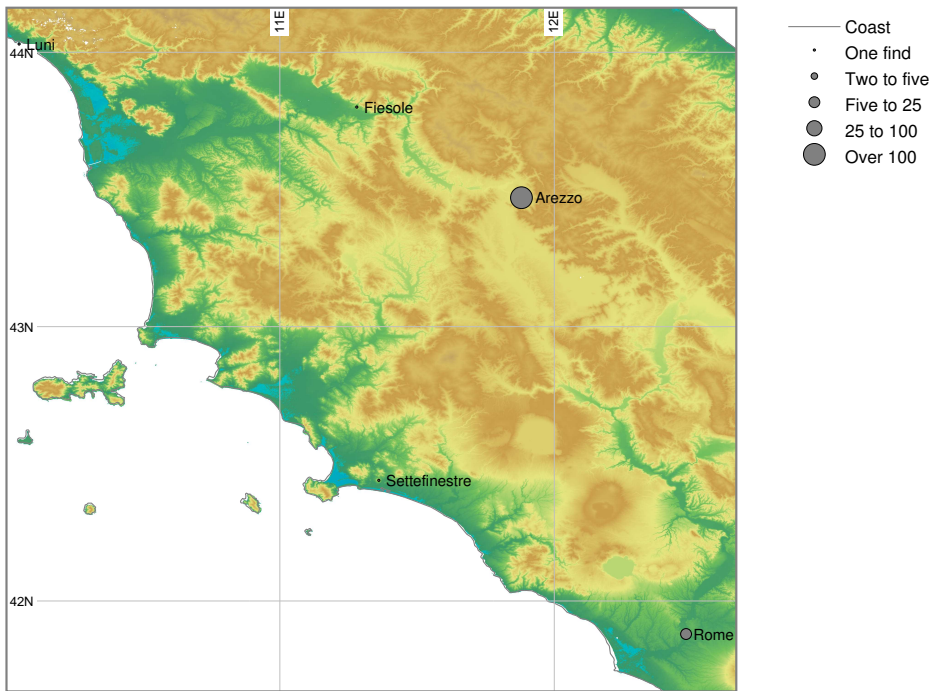


Figure E.17: The distribution map for potter 275 in Etruria

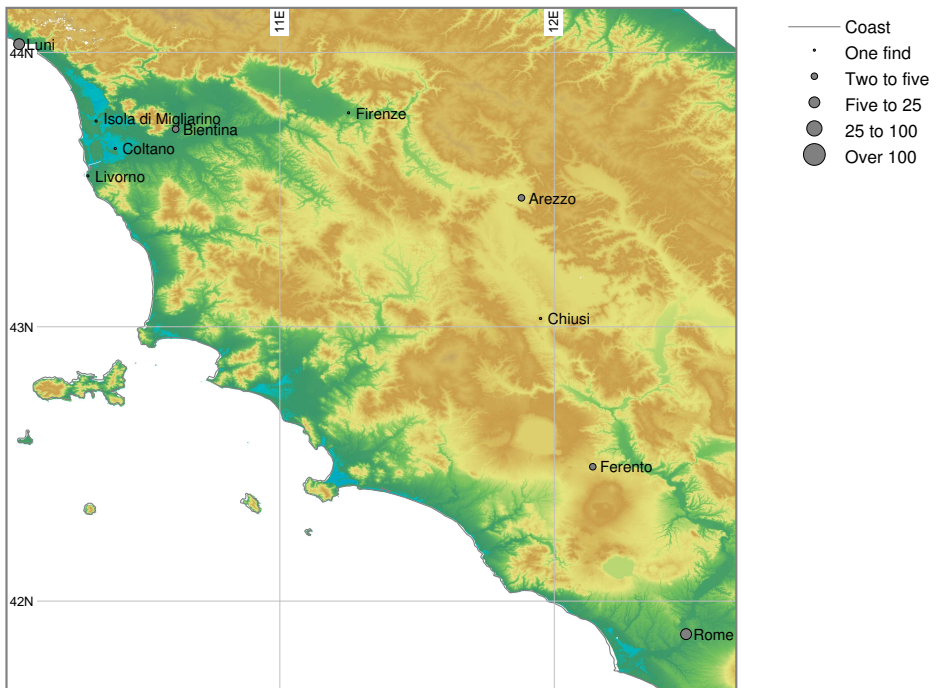


Figure E.18: The distribution map for potter 278 in Etruria

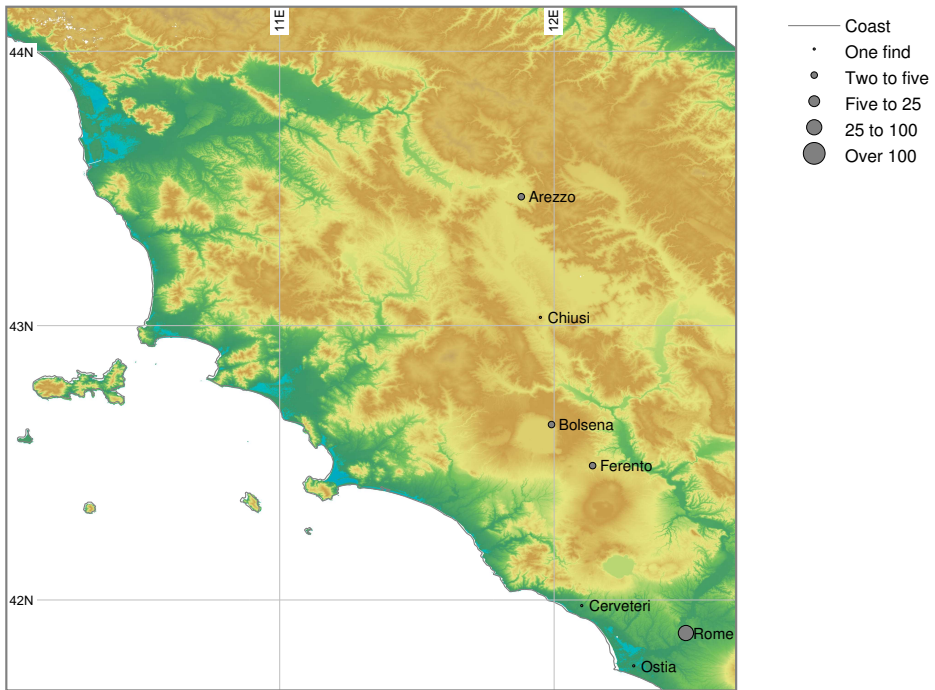


Figure E.19: The distribution map for potter 371 in Etruria

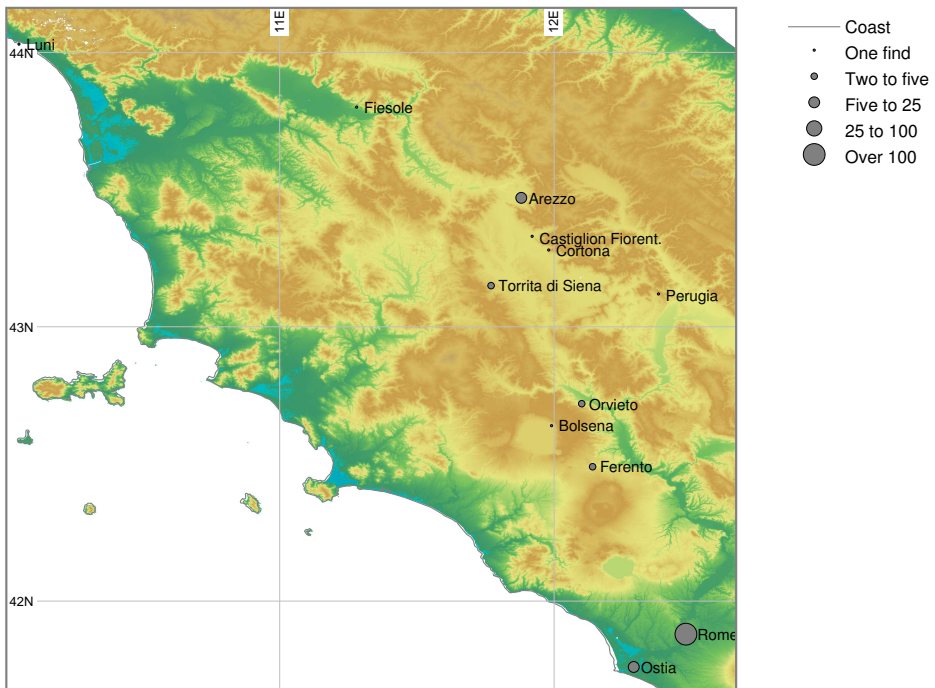


Figure E.20: The distribution map for potter 514 in Etruria

E. Distribution maps of selected potters in Etruria

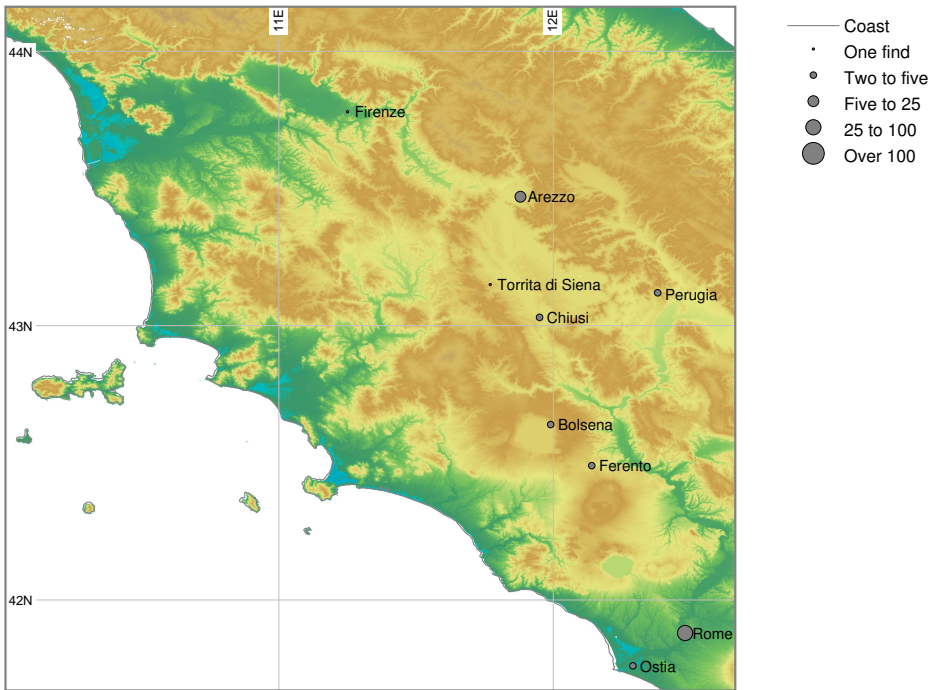


Figure E.21: The distribution map for potter 589 in Etruria

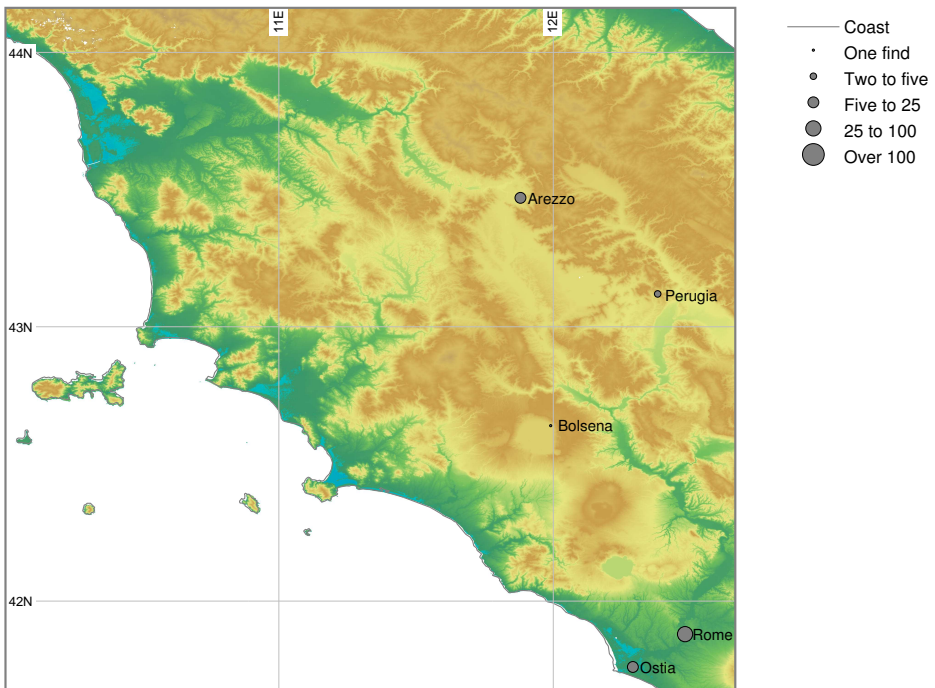


Figure E.22: The distribution map for potter 592 in Etruria

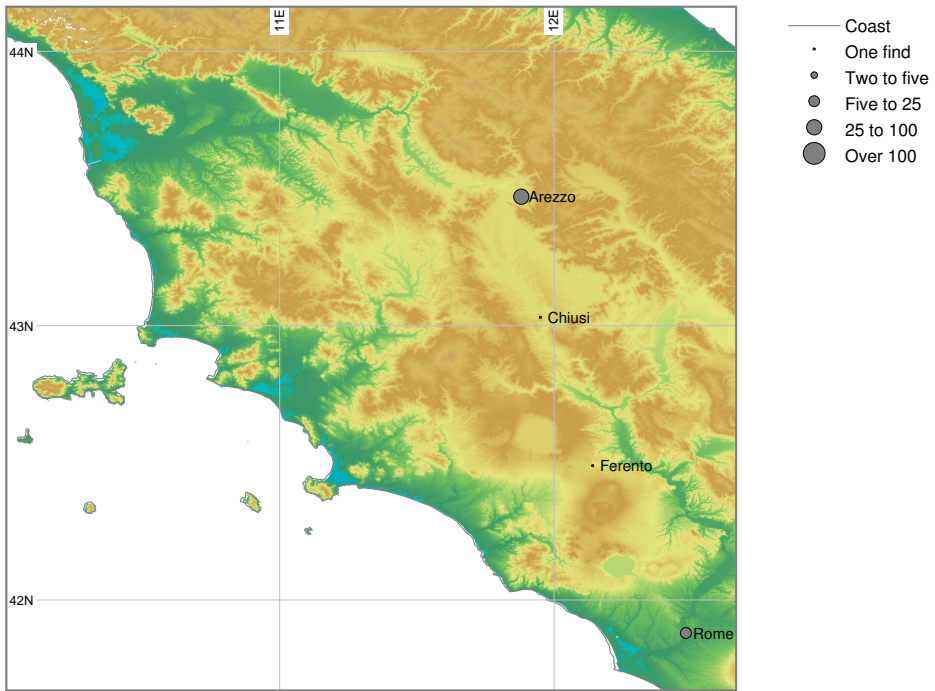


Figure E.23: The distribution map for potter 623 in Etruria

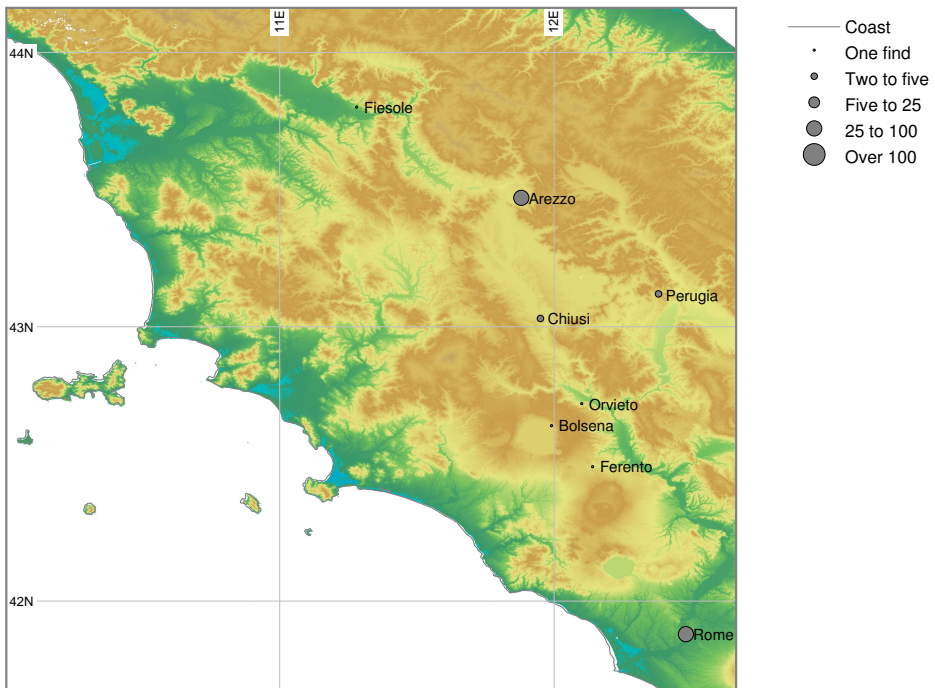


Figure E.24: The distribution map for potter 624 in Etruria

E. Distribution maps of selected potters in Etruria

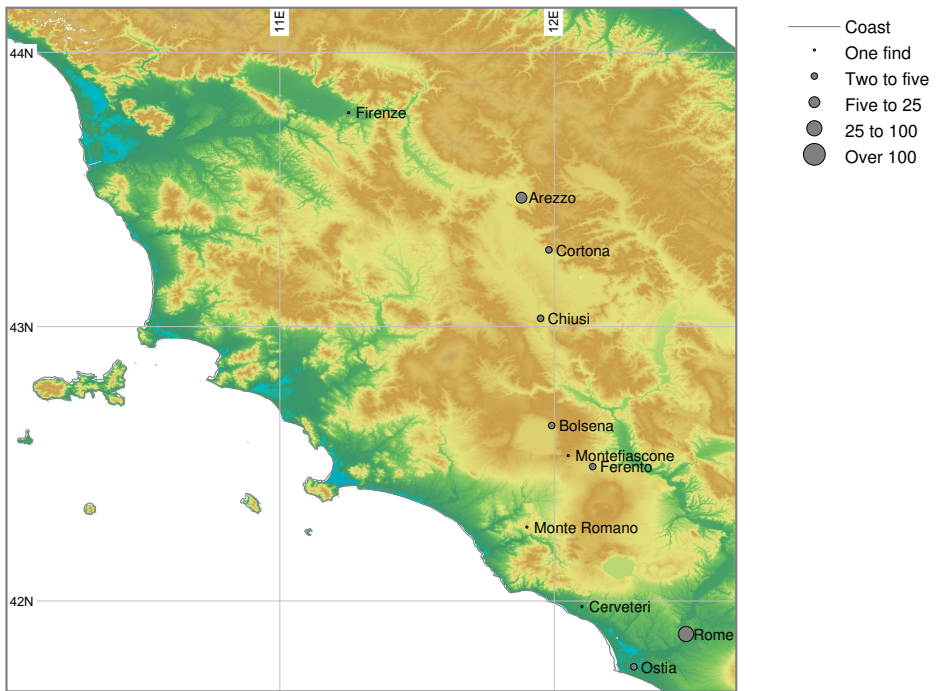


Figure E.25: The distribution map for potter 879 in Etruria

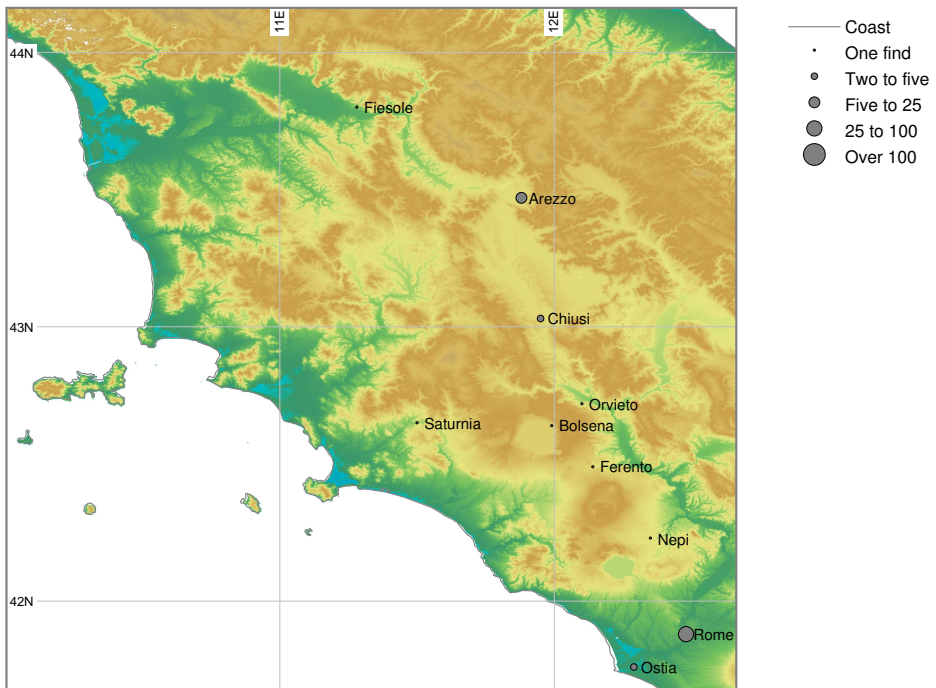


Figure E.26: The distribution map for potter 933 in Etruria

Bibliography

- Agostini, Ilaria (2007). 'Le acque di Tivoli, ovvero considerazioni geografiche-storiche sulla valle dell'Aniene'. *Ri-Vista Ricerche per la progettazione del paesaggio* 8, pp. 105–116.
- Alexander, David (Dec. 1984). 'The Reclamation of Val-di-Chiana (Tuscany)'. *Annals of the Association of American Geographers* 74.4, pp. 527–550.
- Andreau, Jean (1974). *Les affaires de Monsieur Jucundus*. Vol. 18. Collection de l'École française de Rome. Rome: École française de Rome.
- (2000). 'Les marchés hebdomadaires du Latium et de Campanie au Ier siècle ap. J.-C.' Ed. by Elio Lo Cascio. *Pragmateiai* 2. Bari: Edipuglia, pp. 69–92.
- Antonelli, F., G. Nappi and L. Lazzarini (2001). 'Roman Millstones from Orvieto (Italy): Petrographic and Geochemical Data for A New Archaeometric Contribution'. *Archaeometry* 43.2, pp. 167–189.
- Atkinson, Donald (1914). 'A hoard of Samian ware from Pompeii'. *JRS* 4, pp. 26–64.
- Attolini, I. et al (1982). 'Ricognizione archeologica nell'Ager Cosanus e nella valle dell'Albegna. Rapporto preliminare 1981'. *Archeologia Medievale* 9, pp. 365–.
- Attolini, I. et al. (1983). 'Ricognizione archeologica nell'Ager Cosanus e nella valle dell'Albegna. Rapporto preliminare 1982/83'. *Archeologia Medievale* 10, pp. 439–.
- Aubert, Jean-Jacques (1994). *Business Managers in Ancient Rome. A Social and Economic Study of Institores 200 B.C.–A.D. 250*. Vol. 21. Columbia Studies in the Classical Tradition. Leiden – New York – Köln: E. J. Brill.
- Badian, E. (2009). 'Memmius (1), Gaius'. *The Oxford Classical Dictionary*. Ed. by Simon Hornblower and Anthony Spawforth. Oxford University Press.
- Bang, Peter F., Mamoru Ikeguchi and Hartmut G. Ziche, eds. (2007). *Ancient economies, modern methodologies. Archaeology, comparative history, models and institutions*. Vol. 12. *Pragmateiai*. Bari: Edipuglia.
- Bang, Peter Fibiger (2008). *The Roman Bazaar. A Comparative Study of Trade and Markets in a Tributary Empire*. Cambridge: Cambridge University Press.
- Barker, Graeme W. W. et al (1995). *A Mediterranean Valley: Landscape Archaeology and Annales History in the Biferno Valley*. Leicester: Leicester University Press.
- Bass, Frank M. (1969). 'A New Product Growth Model for Consumer Durables'. *Management Science* 15, pp. 215–227.
- (2004). 'Comments on "A New Product Growth for Model Consumer Durables": The Bass Model'. *Management Science* 50.12, pp. 1833–1840.
- Bintliff, John (2002). 'Going to Market in Antiquity'. *Stuttgarter Kolloquium zur Historischen Geographie des Altertums* 7, 1999. *Zu Wasser und zu Land. Verkehrswege in der antiken Welt*. Ed. by Eckart Olshausen and Holger Sonnabend. *Geographica Historica* 17. Stuttgart: Steiner, pp. 209–250.
- Bourdieu, Pierre (2000). *Les structures sociales de l'économie*. s.l.: Seuil.
- Bowman, Alan K., Peter Garney and Dominic Rathbone, eds. (2000). *CAH²*. Vol. XI: *The High Empire, A.D. 70–192*. Cambridge: Cambridge University Press.

- Brecciaroli Taborelli, Luisa (2005). 'Ceramiche a vernice nera'. Ed. by Daniela Gandolfi. Vol. 2. Quaderni della Scuola Interdisciplinare delle Metodologie Archeologiche. Bordighera: Istituto Internazionale di Studi Liguri, pp. 59–104.
- Bruni, Stefano, ed. (1995). *Ateius e le sue fabbriche. La produzione di Sigillata ad Arezzo, a Pisa e nella Gallia meridionale*. ASNP 25. Pisa.
- (2010). 'Le navi antiche di Pisa'. *Il mare degli Etruschi*. (Priombino – Orbetello, 18th–20th Sept. 2009). Edizioni dell'Assemblea 48. Firenze: Consiglio regionale della Toscana, pp. 63–84.
- Cadoux, Theodore John and Robin J. Seager (2009). 'Memmius (2), Gaius'. *The Oxford Classical Dictionary*. Ed. by Simon Hornblower and Anthony Spawforth. Oxford University Press.
- Campbell, Brian (1996). 'Shaping the Rural Environment: Surveyors in Ancient Rome'. *JRS* 86, pp. 74–99.
- Cancik, Hubert, Helmut Schneider and Manfred Landfester, eds. (2008). *Der Neue Pauly*. Leiden: Brill.
- Carandini, Andrea (1983). 'Columella's Vineyard and the Rationality of the Roman Economy'. *Opus* 2, pp. 177–204.
- Carreras Monfort, César (1999). 'The nature of Roman trade: an archaeological perspective'. *MBAH* 18.2, pp. 87–114.
- Casson, Lionel (1965). 'Harbour and River Boats of Ancient Rome'. *JRS* 55, pp. 31–39.
- Cherubini, Linda and Antonella Del Rio (1997). 'Officine ceramiche di età romana nell'Etruria settentrionale costiera: impianti, produzioni, attrezzature'. *RCRF* 35, pp. 133–41.
- Christie, Neil, ed. (1995). *Settlement and Economy in Italy 1500 BC to AD 1500. Papers of the Fifth Conference of Italian Archaeology*. Vol. 41. Oxbow Monograph. Oxford: Oxbow Books.
- Ciampoltrini, Giulio (1991). 'Porti dell'Etruria augustea'. *Athenaeum* 79, pp. 256–259.
- Claudius, C. Suetonius (s.a.). 'Divus Claudius'. *De Vita Caesarum*. Ed. by Maximilian Ihm. Perseus Project.
- Colls, D. and R. et al Etienne (1977). 'L'Épave Port-Vendres II et le commerce de la Bétique à l'époque de Claude'. *Archaeonautica* 1, pp. 3–143.
- Corpus iuris civilis. Corpus iuris civilis*. editio stereotypa quinta. 3 vols.
- De Sena, Eric C. and Janne P. Ikäheimo (2003). 'The Supply of Amphora-borne Commodities and Domestic Pottery in Pompeii 150 BC-AD 79: Preliminary Evidence from the House of the Vestals'. *European Journal of Archaeology* 6.3, pp. 310–321.
- DeLaine, Janet (1995). 'The Supply of Building Materials to the City of Rome'. *Settlement and Economy in Italy 1500 BC to AD 1500. Papers of the Fifth Conference of Italian Archaeology*. Ed. by Neil Christie. Vol. 41. Oxbow Monograph. Oxford: Oxbow Books. Chap. 57, pp. 555–562.
- (1997). *The Baths of Caracalla: A Study in the Design, Construction and Economics of Large-scale Building Projects in Imperial Rome*. Vol. 25. Journal of Roman Archaeology. Supplementary series. Portsmouth: JRA.
- Di Giuseppe, Helga (2005). 'Un confronto tra l'Etruria settentrionale e meridionale dal punto di vista della ceramica a vernice nera'. *PBSR* 73, pp. 31–84.
- Dilke, O. A. W. (1971). *The Roman Land Surveyors*. New York.
- (1974). 'Archaeological and Epigraphic Evidence of Roman Land Surveys'. *Aufstieg und Niedergang der römischen Welt* 2.1, pp. 564–592.
- Docter, Roald Fritjof (2008). 'Terra Sigillata'. *Der Neue Pauly*. Ed. by Hubert Cancik, Helmut Schneider and Manfred Landfester. Leiden: Brill.
- Doody, Aude (Jan. 2009). 'Pliny's *Natural History*: *Enkuklios Paideia* and the Ancient Encyclopedia'. *Journal of the History of Ideas* 70.1, pp. 1–22.
- Dragendorff, H. (1895). 'Terra Sigillata. Ein Beitrag zur Geschichte der griechischen und römischen Keramik'. *Bonner Jahrbücher* 96–97, pp. 18–155.

- Dray, S. and A. B. Dufour (2007). 'The ade4 package: implementing the duality diagram for ecologists'. *Journal of Statistical Software* 22.4, pp. 1–20.
- Duncan-Jones, Richard P. (1974). *The Economy of the Roman Empire. Quantitative Studies*. Cambridge: Cambridge University Press.
- (1982). *The Economy of the Roman Empire: quantitative studies*. Second. Cambridge: Cambridge University Press.
- (1990). *Structure and Scale in the Roman Economy*. Cambridge: Cambridge University Press.
- (1994). *Money and Government in the Roman Empire*. Cambridge: Cambridge University Press.
- Dyson, Stephen L. (1978). 'Settlement Patterns in the Ager Cosanus: the Wesleyan University Survey, 1974-1976'. *JFA* 5, pp. 251–68.
- (1992). *Community and Society in Roman Italy*. Baltimore and London: The Johns Hopkins University Press.
- Erim, Kenan T. and Joyce Reynolds (1973). 'The Aphrodisias Copy of Diocletian's Edict on Maximum Prices'. *JRS* 63, pp. 99–110.
- Erim, Kenan T., Joyce Reynolds and Michael Crawford (1971). 'Diocletian's Currency Reform: A New Inscription'. *JRS* 61, pp. 171–177.
- Erim, Kenan T. et al. (1970). 'The Copy of Diocletian's Price Edict on Maximum Prices from Aphrodisia in Caria'. *JRS* 60, pp. 120–141.
- Finley, Moses I. (May 1970). 'Aristotle and Economic Analysis'. *Past and Present* 47, pp. 3–25.
- (1985). *The Ancient Economy*. 2nd ed. Berkeley and Los Angeles.
- (1999). *The Ancient Economy; with a foreword by Ian Morris*. Ed. by Ian Morris. Updated. Berkeley: University of California Press.
- Ford, T. D. and H. M. Pedley (1996). 'A review of tufa and travertine deposits of the world'. *Earth-Science Reviews* 41, pp. 117–175.
- Frayn, Joan M. (1993). *Markets and Fairs in Roman Italy: their social and economic importance from the second century BC to the third century AD*. Oxford: Clarendon Press.
- Fülle, Gunnar (1997). 'The Internal Organization of the Arretine Terra Sigillata Industry: Problems of Evidence and Interpretation'. *JRS* 87, pp. 111–155.
- (2000a). 'Die organisation der Terra sigillata-Herstellung in La Graufesenque. Die Hersteller-signaturen'. *Laverna. Beiträge zur Wirtschafts- und Sozialgeschichte der Alten Welt* 11, pp. 44–70.
- (2000b). 'Die Organisation der Terra sigillata-Herstellung in La Graufesenque. Die Töpfergrafiti'. *MBAH* 19.2, pp. 62–98.
- Gagé, Jean (1964). *Les classes sociales dans l'empire Romain*. Paris: Payot.
- Gandolfi, Daniela, ed. (2005). *La ceramica e i materiali di età romana. Classi, produzioni, commerci e consumi*. Vol. 2. Quaderni dell Scuola Interdisciplinare delle Metodologie Archeologiche. Bordighera: Istituto Internazionale di Studi Liguri.
- Garnsey, Peter (2000). 'The Land'. *CAH²*. Vol. XI: *The High Empire, A.D. 70–192*. Ed. by Alan K. Bowman, Peter Garney and Dominic Rathbone. Cambridge: Cambridge University Press, pp. 679–709.
- Gill, David W. J. (1991). 'Pots and Trade: Spacefillers or Objects D'art'. *The Journal of Hellenic Studies* 111, pp. 29–47.
- Glasbergen, Willem and Sophia M. E. van Lith (1977). 'Italische und Frühe Südgalische Terra Sigillata aus Velsen (Provinz Nord-Holland)'. *RCRF* 17/18, pp. 5–21.
- Gliozzo, E. and I. Memmi Turbanti (May 2004). 'Black Gloss Pottery: Production Sites and Technology in Northern Etruria, Part I: Provenance Studies'. *Archaeometry* 46.2, pp. 201–225.

- Goudineau, Christian (1968). *Fouilles de l'École française de Rome à Bolsena (Poggio Moscini), 1962–1967. Tome IV, La céramique arétine lisse*. Vol. 6. Mélanges d'archéologie et d'histoire. Suppléments. Paris: De Boccard.
- Gower, J. C. and P. Legendre (1986). 'Metric and Euclidean properties of dissimilarity coefficients'. *Journal of Classification*, pp. 5–48.
- Grant, Michael (1995). *Greek and Roman Historians: Information and Misinformation*. London & New York: Routledge.
- Greene, Kevin (1992). *Roman Pottery*. London.
- (2007). 'Archaeological data and economic interpretation'. *Ancient economies, modern methodologies. Archaeology, comparative history, models and institutions*. Ed. by Peter F. Bang, Mamoru Ikeguchi and Hartmut G. Ziche. Vol. 12. Pragmateiai. Bari: Edipuglia, pp. 109–136.
- Guerrini, Cl. and L. Mancini (2007). 'La ceramica di età romana'. Ed. by Università di Siena Dipartimento di Archaeologia e Storia delle Arti. Firenze. Chap. 12.
- Gulbekian, Edward (1987). 'The origin and value of the stadion unit used by Eratosthenes in the third century B.C.'. *Archive for the History of Exact Sciences* 37.4, pp. 359–363.
- Habinek, Thomas N. (1998). *The Politics of Latin Literature. Writing, Identity, and Empire in Ancient Rome*. Princeton, New Jersey: Princeton University Press.
- Hajage, David (2010). *ascii: Export R objects to several markup languages*. R package version 0.7.
- Hale, J. R. (2001). *Florence and the Medici: The Pattern of Control*. Orion.
- Harris, William V. (1971). *Rome in Etruria and Umbria*. Oxford.
- ed. (1993). *The Inscribed Economy. Production and distribution in the Roman empire in the light of instrumentum domesticum*. The proceedings of a conference held at The American Academy in Rome on 10–11 January, 1992. *Journal of Roman Archaeology*. Supplementary series 6. Ann Arbor: JRA.
- (2000). 'Trade'. *CAH²*. Vol. XI: *The High Empire, A.D. 70–192*. Ed. by Alan K. Bowman, Peter Garney and Dominic Rathbone. Cambridge: Cambridge University Press, pp. 710–740.
- (2007). 'The late Republic'. Ed. by Walter Scheidel, Ian Morris and Richard Saller. Cambridge: Cambridge University Press. Chap. 19, pp. 511–539.
- Hopkins, Keith (Nov. 1966). 'On the Probable Age Structure of the Roman Population'. *Population Studies* 20.2, pp. 245–264.
- (1978). 'Economic growth and towns in classical antiquity'. *Towns in Societies. Essays in Economic History and Historical Sociology*. Ed. by P. Abrams and E. A. Wrigley. Cambridge: Cambridge University Press.
- (1980). 'Taxes and Trade in the Roman Empire'. *JRS* 70, pp. 101–125.
- (1995/96). 'Rome, Taxes, Rents and Trade'. *Kodai* 6/7, pp. 41–75.
- (2000). 'Rents, Taxes, Trade and the City of Rome'. Ed. by Elio Lo Cascio. Pragmateiai 2. Bari: Edipuglia, pp. 253–268.
- Houston, Geogre W. (1988). 'Ports in Perspective: Some Comparative Materials on Roman Merchant Ships and Ports'. *AJA* 92.4, pp. 553–564.
- Härdle, Wolfgang K. and Leopold Simar (2007). *Applied Multivariate Statistical Analysis*. 2nd ed. Berlin Heidelberg: Springer.
- Jones, G. D. B. (1963). 'Capena and the Ager Capenas: part II'. *PBSR* 31.
- Jongman, Willem M. (2007a). 'Gibbon was right: the decline and fall of the Roman economy'. Proceedings of the Seventh International Workshop of the International Network Impact of Empire (Nijmegen, June 20–24, 2006). *Crises and the Roman Empire. Proceedings of the Seventh International Workshop of the International Network Impact of Empire*. Ed. by Olivier Hekster, Gerda Kleijn de and Daniëlle Sloopjes. Leiden: E.J. Brill, pp. 183–199.

- (2007b). ‘The rise and fall of the Roman economy: population, rents and entitlement’. *Ancient economies, modern methodologies. Archaeology, comparative history, models and institutions*. Ed. by Peter F. Bang, Mamoru Ikeguchi and Hartmut G. Ziche. Vol. 12. Pragmateiai. Bari: Edipuglia, pp. 237–254.
- Kalberg, Stephen (1980). ‘Max Weber’s Types of Rationality: Cornerstones for the Analysis of Rationalization Processes in History’. *American Journal of Sociology* 85.5, pp. 1145–1179.
- Kenrick, Philip M. (1997). ‘Cn. Ateius – The Inside Story’. *RCRF* 35, pp. 179–90.
- Keppie, Lawrence (1984). ‘Colonisation and Veteran Settlement in Italy in the First Century A.D.’ *PBSR* 52, pp. 77–114.
- Kessler, David and Peter Temin (May 2007). ‘The organization of the grain trade in the early Roman Empire’. *The Economic History Review* 60.2, pp. 313–332.
- Kiiskinen, Harri (2010). ‘Talous, käytänte ja kvantitatiivinen analyysi kulttuurihistoriallisesti suuntautuneessa tutkimuksessa’. *Kulttuurihistoriallinen katse*. Ed. by Heli Rantala and Sakari Ollitervo. Cultural History – Kulttuurihistoria 8. Turku: k&h, pp. 80–97.
- King, A. (1999). ‘Diet in the Roman world: a regional inter-site comparison of the mammal bones’. *JRA* 12, pp. 168–202.
- Kron, G[eoffrey] (2005). ‘The Augustan census figures and the population of Italy’. *Athenaeum* 93.2, pp. 441–495.
- Křížek, František (1961). ‘Vasa Arretina’. *RCRF* 3, pp. 35–43.
- Laurence, Ray (1994). *Roman Pompeii. Space and Society*. London and New York: Routledge.
- (1998). ‘Land transport in Roman Italy: Costs, practice, and the economy’. *Trade, traders and the ancient city*. London, pp. 129–148.
- (1999). *The Roads of Roman Italy. Mobility and Cultural Change*. London and New York: Routledge.
- Le Gall, Joël (2005). *Il Tevere, fiume di Roma nell’antichità*. Seconda edizione aggiornata (orig. 1953). Ed. by Claudio Mocchegiani Carpano and Giuseppina Pisani Sartorio. Roma: Edizioni Quasar.
- Levick, Barbara (Oct. 2004). ‘The Roman Economy: Trade in Asia Minor and the Niche Market’. *Greece & Rome* 51.2, pp. 180–198.
- Ligt, Luuk de (1993). *Fairs and Markets in the Roman Empire : economic and social aspects of periodic trade in a pre-industrial society*. Amsterdam: Gieben.
- Liou, Bernard (1973). ‘Epave 3 de Planier’. *Gallia* 31, pp. 586–589.
- (1990). ‘Le commerce de la Bétique au I^{er} siècle de notre ère. Notes sur l’épave Lavezzi I (Bonifacio, Course de Sud)’. *Archaeonautica* 10, pp. 125–156.
- Liou, Bernard and Claude Domergue (1990). ‘Le commerce de la Bétique au I^{er} siècle de notre ère. L’épave Sud-Lavezzi 2 (Bonifacio, Corse de Sud)’. *Archaeonautica* 10, pp. 11–124.
- Lo Cascio, Elio, ed. (2000). *Mercati permanenti e mercati periodici nel mondo romano : atti degli incontri capresi di storia dell’economia antica (Capri 13-15 ottobre 1997)*. Pragmateiai 2. Bari: Edipuglia.
- MacMullen, Ramsay (2000). *Romanization in the Time of Augustus*. New Haven and London: Yale University Press.
- Maechler, Martin et al. (2005). ‘Cluster Analysis Basics and Extensions’. Rousseeuw et al provided the S original which has been ported to R by Kurt Hornik and has since been enhanced by Martin Maechler: speed improvements, silhouette() functionality, bug fixes, etc. See the ‘Changelog’ file (in the package source).
- Mahajan, Vijay, Eitan Muller and Frank M. Bass (1995). ‘Diffusion of New Products: Empirical Generalizations and Managerial Uses’. *Marketing Science* 14.3, G79–G88.

- Malfitana, Daniele (2006). 'Appropriazione di «copyright», falsificazione o ingannevole messaggio pubblicitario nel marcio *ARRETTINVM*? Nota sui rapporti tra archeologica e storia del diritto romano'. *MBAH* 25.2, pp. 149–168.
- Manacorda, Daniele (1993). 'Appunti sulla bollatura delle merci in età romana'. The proceedings of a conference held at The American Academy in Rome on 10-11 January, 1992. *The Inscribed Economy. Production and distribution in the Roman empire in the light of instrumentum domesticum*. Ed. by William V. Harris. Journal of Roman Archaeology. Supplementary series 6. Ann Arbor: JRA, pp. 37–54.
- Marichal, Robert (1988). *Les graffites de la Graufesenque*. Gallia; suppl. 47. Paris: Éditions du centre National de la Recherche Scientifique.
- Martin, René (1971). *Recherches sur les agronomes latins et leurs conceptions économiques et sociales*. Paris: les Belles Lettres.
- Masters, Roger D. (1998). *Fortune Is a River. Leonardo da Vinci and Niccolò Machiavelli's magnificent dream to change the course of Florentine history*. Plume.
- McCann, Anna Marguerite (1987). 'The Portus Cosanus: A Center of Trade in the Late Republic'. *RCRF* 25/26, pp. 21–70.
- Mees, Allard W. (2011). *Die Verbreitung von Terra Sigillata aus den Manufakturen von Arezzo, Pisa, Lyon und La Graufesenque*. Monographien des Römisch-Germanischen Zentralmuseums 93. Mainz: Verlag des Römisch-Germanischen Zentralmuseums.
- Meikel, S. (1991). 'Aristotle and exchange value'. *A Companion to Aristotle's Politics*. Ed. by D. Keyt and F. D. Miller. Cambridge, Mass., pp. 156–181.
- Menchelli, Simonetta (1997). 'Terra sigillata Pisana: forniture militari e «libero mercato»'. *RCRF* 35, pp. 191–8.
- (2005). 'La terra sigillata'. Ed. by Daniela Gandolfi. Vol. 2. Quaderni della Scuola Interdisciplinare delle Metodologie Archeologiche. Bordighera: Istituto Internazionale di Studi Liguri, pp. 155–168.
- Menchelli, Simonetta et al. (2001). 'Ateliers de céramiques sigillées de l'Étrurie septentrionale maritime : données archéologiques et archéométriques'. *RCRF* 37, pp. 89–105.
- Middleton, P. (1980). 'La Graufesenque: a question of marketing'. *Athenaeum* 58, pp. 186–191.
- Mommsen, Theodor (1843). *De collegiis et sodaliciis romanorum*. Kiliae: Libraria Schwebsiana.
- Moore, Karl and Susan Reid (July 2008). 'The birth of brand: 4000 years of branding'. *Business History* 50.4, pp. 419–432.
- Morciano, Maria Milvia (2008). 'Volaterrae'. Ed. by Hubert Cancik, Helmut Schneider and Manfred Landfester. Leiden: Brill.
- Morley, Neville (1996). *Metropolis and hinterland : the city of Rome and the Italian economy: 200 B.C. - A.D. 200*. Cambridge: Cambridge University Press.
- Nenninger, Marcus (2001). *Die Römer und der Wald : Untersuchungen zum Umgang mit einem Naturraum am Beispiel der römischen Nordwestprovinzen*. Vol. 16. Geographica Historica. Stuttgart: Franz Steiner Verlag.
- Nicolet, Claude (1994). 'Economy and Society, 133–43 B.C.'. *CAH²*. Vol. IX: *The Last Age of the Roman Republic, 146–43 B.C.* Ed. by J. A. Crook, Andrew Lintott and Elizabeth Rawson. Cambridge: Cambridge University Press, pp. 599–643.
- Nieto, J. (1986). 'El pecio *Culip IV*: obsevaciones sobre la organización de los talleres de *terra sigillata* de la Graufesenque'. *Archaeonautica* 6, pp. 86–119.
- Nollé, Johannes (1982). *Nundinas instituere et habere. Epigraphische Zeugnisse zur Einrichtung und Gestaltung von ländlichen Märkten in Afrika und in der Provinz Asia*. Vol. IX. Subsidia Epigraphica. Quellen und Abhandlungen zur griechischen Epigraphik. Hildesheim – Zürich – New York: Georg Olms Verlag.

- Nonno De, Marco (2005). 'I marchi di fabbrica e la terra sigillata'. Ed. by Daniela Gandolfi. Vol. 2. Quaderni della Scuola Interdisciplinare delle Metodologie Archeologiche. Bordighera: Istituto Internazionale di Studi Liguri, pp. 183–9.
- Papi, Emanuele (2000). *L'Etruria dei Romani. Opere pubbliche e donazioni private in età imperiale*. Vol. 1. Etruria Romana. Roma: Edizioni Quasar.
- Parker, A. J. (1992). *Ancient Shipwrecks of the Mediterranean and the Roman Provinces*. Oxford: Tempvs Reparatum.
- Pasquinucci, Marinella and Antonella Del Rio (2004). 'Commercial flows, ports and hinterlands in North Coastal Etruria (late Republican - late Roman period)'. Ed. by Marinella Pasquinucci and Timm Weski. British Archaeological Reports. International Series 1283. Oxford: Archaeopress, pp. 53–65.
- Pasquinucci, Marinella and Simonetta Menchelli (1995). 'Paesaggio agrario e produzioni artigianali nell'Etruria Settentrionale Costiera (Ager Pisanus e Volaterranus)'. Ed. by Neil Christie. Vol. 41. Oxbow Monograph. Oxford: Oxbow Books, pp. 209–217.
- (1999). 'The Landscape and Economy of the Territories of Pisae and Volaterrae (Coastal North Etruria)'. *JRA* 12.1, pp. 122–141.
- Patterson, Helen, Francesco Di Gennaro and Helga et al Di Giuseppe (2000). 'The Tiber Valley Project : the Tiber and Rome through two millennia'. *Antiquity* 74.284, pp. 395–403.
- Peacock, David P. S. (1977). 'Pompeian Red Ware'. *Potter and Early Commerce: Characterisation and Trade in Roman and Later Ceramics*. Ed. by D. P. S. Peacock. London: Academic Press.
- (1982). *Pottery in the Roman World: An Ethnoarchaeological Approach*. London & New York: Longman.
- Pedroni, L. (1988). 'La scomparsa dei bolli sulla ceramica a vernice nera'. *Samnium* 61, pp. 1–17.
- (1995). 'Riflessioni sulla nascita dell'aretina'. *Ostraka* 4, pp. 195–204.
- Perry, Jonathan Scott (2006). *The Roman collegia : the modern evolution of an ancient concept*. Vol. 277. Mnemosyne, Supplementum. Leiden: Brill.
- Picon, Maurice (1995). 'Etudes en laboratoire et production des officines d'Ateius: bilan et perspectives'. *Ateius e le sue fabbriche. La produzione di Sigillata ad Arezzo, a Pisa e nella Gallia meridionale*. Ed. by Stefano Bruni. ASNP 25. Pisa, pp. 403–410.
- Picon, Maurice and J. Lasfargues (1974). 'Transfert de moules entre les ateliers d'Arezzo et ceux de Lyon'. *RAE* 25, pp. 61–69.
- Pisani Sartorio, Giuseppina, Antonio Maria Colini and Carlo Buzzetti (1986). 'Portus Tiberinus'. *Il Tevere e le altre vie d'acqua del Lazio antico. Settimo Incontro di studio del comitato per l'archeologia laziale*. Ed. by Stefania Quilici Gigli. Vol. 12. Quaderni del centro di studio per l'archeologia etrusco-italica. Roma: Consiglio Nazionale delle Ricerche, pp. 157–198.
- Plinius Secundus, Gaius (1906). *Naturalis historia*. Ed. by Carolus Mayhoff. Lipsiae: Teubner.
- (1967). *Naturalis historia*. Ed. by Carolus Mayhoff. Editio stereotypa editionis prioris (MCMVI). Stvtgardiae: Teubner.
- Potter, T. W. (1979). *The Changing Landscape of South Etruria*. London: Paul Elek.
- Prachner, Gottfried (1980). *Die Sklaven und Freigelassenen im arretinischen Sigillatagewerbe : epigrafische, nomenklatorische sowie sozial- und wirtschaftsgeschichtliche Untersuchungen der arretinischen Firmen- und Töpferstempel*. Wiesbaden: Steiner.
- Pucci, Giuseppe (1973). 'La produzione della ceramica aretina. Note sull'industria nella prima età imperiali'. *DArch* 7, pp. 255–293.
- (1981). 'La ceramica italica (terra sigillata)'. *Società romana e produzione schiavistica. II Mercati, mercati e scambi nel Mediterraneo*. Ed. by Andrea Giardina and Aldo Schiavone. Roma – Bari: Editori Laterza, pp. 99–121.

- Pucci, Giuseppe (1985). 'Terra sigillata italica'. *Enciclopedia dell'arte antica. Atlante delle forme ceramiche II. Ceramica fine romana nel bacino mediterraneo (tardo ellenismo e primo impero)*. Roma, pp. 359–406.
- ed. (1992). *La fornace di Umbricio Cordo. L'officina di un ceramista romano e il territorio di Torrita di Siena nell'antichità*. Firenze: All'Insegna del Giglio.
- (1993). 'I bolli sulla «terra sigillata»: fra epigrafia e storia economica'. The proceedings of a conference held at The American Academy in Rome on 10-11 January, 1992. *The Inscribed Economy. Production and distribution in the Roman empire in the light of instrumentum domesticum*. Ed. by William V. Harris. Journal of Roman Archaeology. Supplementary series 6. Ann Arbor: JRA, pp. 73–9.
- Quilici, Lorenzo (1986). 'Il Tevere e l'Aniene come vie d'acqua a monte di Roma in età imperiale'. Ed. by Stefania Quilici Gigli. Vol. 12. Quaderni del centro di studio per l'archeologia etrusco-italica. Roma: Consiglio Nazionale delle Ricerche, pp. 198–217.
- Quilici Gigli, Stefania, ed. (1986). *Il Tevere e le altre vie d'acqua del Lazio antico. Settimo Incontro di studio del comitato per l'archeologia laziale*. Vol. 12. Quaderni del centro di studio per l'archeologia etrusco-italica. Roma: Consiglio Nazionale delle Ricerche.
- R Development Core Team (2009). *R: A Language and Environment for Statistical Computing*. ISBN 3-900051-07-0. R Foundation for Statistical Computing. Vienna, Austria.
- Radt, Stefan (2007). *Strabons Geographika*. Vol. 6: *Buch V–VIII: Kommentar*. Vandenhoeck & Ruprecht.
- Ripley, Brian, and from 1999 to Oct 2002 Michael Lapsley (2009). *RODBC: ODBC Database Access*. R package version 1.3-1.
- Sangriso, Paolo (1998). 'Terra sigillata e politica Augustea: alcune note su Cn. Ateius'. *SCO XLVI*:3, pp. 919–32.
- Santangelo, Federico (2007). *Sulla, the Elites and the Empire. A Study of Roman Politics in Italy and the Greek East*. Vol. 8. Impact of Empire. Leiden & Boston: Brill.
- Santrot, Marie-Hélène et al. (1992). 'Production, importation et consommation de céramique à Bolsena au IIe s. av. J.-C. et au Ier s. ap. J.-C.: quelques apports de la citerne 5'. *RCRF 31/32*, pp. 41–55.
- Say, Jean-Baptiste (1855). *A Treatise on Political Economy*. Ed. by Clement C. Biddle. Trans. by C. R. Prinsep. Philadelphia: Lippincott, Grambo & Co.
- Scheidel, Walter (1996). *Measuring sex, age and death in the Roman Empire: explorations in ancient demography*. Journal of Roman Archaeology. Supplementary series 21. Ann Arbor, Mich.: JRA.
- (2005). 'From monetization to culture change'. *Archaeological Dialogues* 12.1, pp. 35–37.
- (2007). 'A Model of Real Income Growth in Roman Italy'. *Historia* 56.3, pp. 322–346.
- (2008). 'The Divergent Evolution of Coinage in Eastern and Western Eurasia'. Ed. by William V. Harris. Oxford: Oxford University Press, pp. 267–286.
- Schindler, M. (1976). *Die "Schwarze Sigillata" des Magdalensberges*. Klagenfurt.
- Schlippschuh, Otto (1974). *Die Händler im römischen Kaiserreich in Gallien, Germanien und den Donauprovinzen Rätien, Noricum und Pannonien*. Amsterdam: Hakkert.
- Schumpeter, Joseph A. (1954). *History of economic analysis*. New York; London: Oxford University Press.
- Scott, Joan Wallach (1999). *Gender and the politics of history*. Revised edition. New York: Columbia University Press.
- Setälä, P[äivi] (1977). *Private domini in Roman brick stamps of the Empire*. Vol. 9.2. AIRF. Roma.
- Shuey, E. (1981). 'Underwater Survey and Excavation at Gravisca, the Port of Tarquinia'. *PBSR* 49, pp. 17–45.

- Simpson, Grace (1976). 'Decorated Terra Sigillata at Montans (Tarn) from the Manuscript of Elie Rossignol at Albi'. *Britannia* 7, pp. 244–273.
- Slane, K. W. (1989). 'Corinthian ceramic imports: the changing pattern of provincial trade in the first and second centuries A.D.' *The Greek Renaissance in the Roman Empire*. Ed. by S. Walker and A. Cameron. London, pp. 219–225.
- Spawforth, Anthony J. S. (2009). 'Pausanias (3)'. *The Oxford Classical Dictionary*. Ed. by Simon Hornblower and Anthony Spawforth. Oxford University Press.
- Steinby, Margareta (1993). 'L'organizzazione produttiva dei laterizi : un modello interpretativo per l'instrumentum in genere?' The proceedings of a conference held at The American Academy in Rome on 10-11 January, 1992. *The Inscribed Economy*. Ed. by William V. Harris. Journal of Roman Archaeology. Supplementary series 6. Ann Arbor: JRA, pp. 139–43.
- Storey, G.R. (1997). 'The Population of Ancient Rome'. *Antiquity* 71.274, pp. 966–978.
- Suaudeau, R. (1957). *La doctrine économique de Columelle*. Paris: Publ. La Librairie du recueil Sirey.
- Sölch, Reinhard (1999). *Die Terra-Sigillata-Manufaktur von Schwabmünchen-Schwabegg*. Kallmünz: Verlag Michael Lassleben.
- Tamburini, Pietro (1990). 'Contributi per la storia del territorio Volsiniese. II. L'abitatio di Castellonchio (Orvieto-TR): Qualche nota sul popolamento del territorio volsiniese trà in bronzo finale e la prima età del ferro'. *Archeologia Classica* 42, pp. 1–28.
- Taubenschlag, Rafael (1932). 'Die societas negotiationis im Recht'. *ZRG* 52, pp. 64–77.
- Terrenato, Nicola (1998). '*Tam Firmum Municipium*: The Romanization of Volaterrae and Its Cultural Implications'. *JRS* 88, pp. 94–114.
- Tilhard, J. L. et al. (1992). 'Les céramiques sigillées italiques à Saintes (Mediolanum Santonum) (Charente-Maritime, France)'. avec la collaboration de Jean-Louis Hillariet, Christian Vernou, Guy Vienne. *RCRF* 31/32, pp. 231–254.
- Vogt, Jürgen V., Roberto Colombo and Francesca Bertolo (July 2003). 'Deriving drainage networks and catchment boundaries: a new methodology combining digital elevation data and environmental characteristics'. *Geomorphology* 53.3–4, pp. 281–298.
- Ward-Perkins, J. B. (1957). 'Etruscan and Roman Roads in Southern Etruria'. *JRS* 47, pp. 139–143.
- (Dec. 1962). 'Etruscan Towns, Roman Roads and Medieval Villages: The Historical Geography of Southern Etruria'. *GJ* 128.4, pp. 389–404.
- Witcher, Robert (2006). 'Settlement and Society in Early Imperial Etruria'. *JRS* 96, pp. 88–124.
- Yeo, Cedric A. (1946). 'Land and Sea Transportation in Imperial Italy'. *Transactions and Proceedings of the American Philological Association* 77, pp. 221–244.
- Zwalve, Willem J. (2002). 'Callistus' Case. Some Legal Aspects of Roman Business Activities'. Proceedings of the Second Workshop of the International Network Impact of Empire (Roman Empire, c. 200 B.C. - A.D. 476). *The Transformations of Economic Life under the Roman Empire*. Ed. by Lukas de Blois and John Rich. Vol. 2. Impact of Empire. Leiden: Brill, pp. 116–127.