

Art and Markets in the Greco-Roman World

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We study art markets in the Greco-Roman world to explore the origins of artistic innovations in classical Greece and the mass production of imitative works in the Roman Empire. Economic factors may have played a role, on one side fostering product innovations when a few rival Greek city-states competed, outbidding each other to obtain higher-quality artworks, and on the other side fostering process innovations when a large integrated market promoted art trade across the Mediterranean Sea. The evidence on art prices is consistent with this. Literary evidence on classical Greek painting from V–III centuries BC (largely from Pliny the Elder) shows that the real price of masterpieces increased up to the peak of creativity reached with Apelles. Epigraphic evidence on Roman sculpture from I–III centuries AD (largely from inscriptions at the base of statues) shows that the real price of statues was stable and largely equalized across the imperial provinces.

Classical Greece developed artistic innovations that affected the history of mankind and that we know mostly through ancient Roman copies. In this work, we explore the economic determinants of artistic production and innovation in the Greco-Roman world, analyzing the markets for paintings and statues from those periods. We do so based on two limited sources of evidence that are available for those ancient markets. The first are literary sources that survived until our days. The most important is the *Naturalis Historia* of Pliny the Elder (23/24–79 AD), published in 77 AD, an encyclopedic work on all the fields of human knowledge, which includes books on art history.¹ Pliny and a few other historians have provided valuable information on ancient artists and, for our purposes,

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¹ The records of Pliny on ancient masterpieces derive from earlier Greek manuscripts that are now lost. See Isager (1991) for a discussion on how reliable these records are.

also on the price of a variety of artworks, in particular paintings from classical Greece. The second source of information is represented by epigraphic sources, namely inscriptions on stones, which occasionally provide evidence on art commissions, in particular sculptural decorations of temples, forums, and baths in Roman towns. The main source for the price of Roman statues is represented by inscriptions found around the provinces of the Roman Empire and collected in various works (especially the fundamental one by Duncan-Jones (1982)).^{2,3}

The main question we explore is why unprecedented artistic innovations took place in classical Greece between the V and the III centuries BC, while most of the artistic production at the height of the Roman Empire between the I and the III centuries AD was directed toward mass production of imitative works. These periods had much in common in terms of cultural values and socio-economic organization, but there were various factors that may have shaped differences in the evolution of artistic creativity. Our limited goal is to emphasize a structural difference between art markets that may have affected the incentives to innovate and verify whether such a mechanism is consistent with the available evidence. The structural difference is about the size of the relevant art market in the small Greek world and in the large Roman Empire; this may have determined the propensity to invest in product or process innovations, with different consequences on the trends of art prices. According to theories of artistic creativity and investment (e.g., Cowen and Tabarrok 2000) and our stylized model of the evolution of artistic quality by workshops⁴ investing in quality-enhancing and cost-saving innovations, market size is a determining factor in the cost-benefit analysis of the artists. A small market with demand driven by competing wealthy patrons tends to favor investment in higher quality that appeals to elite tastes, which leads to increasing prices for innovative works. A large integrated market with demand driven by anonymous buyers tends to favor reproducibility for popular tastes and cost-saving innovations, leading to stable prices across time and space.

² Latin inscriptions are collected in the *Corpus Inscriptionum Latinarum* and Greek inscriptions in the *Inscriptiones Graecae*. Their online derivations are constantly updated with new findings (see the Claus/Slaby dataset). This made it possible to complete existing datasets with inscriptions discovered or published in the last four decades. The content of epigraphic sources is highly reliable, though the texts of the inscriptions are not always fully readable.

³ For art historical accounts with some emphasis on the social history of art, see, in particular, Stewart (1990) and Seaman and Schultz (2017) on Greek art, and Kleiner (1992) and Stewart (2008) on Roman art. English translations of the relevant classics can be found in Pollitt (1983, 1990).

⁴ The workshop is the traditional unit of production in the classical art market, with a master surrounded by assistants and young apprentices learning the profession.

The Greek civilization developed a socio-economic environment organized in various city-states distributed over a small region across the Aegean Sea. These *póleis* were rivals not only from a political and economic point of view, but also in the competition for artworks needed to decorate sanctuaries, temples, and palaces, which attracted the activity of itinerant artists and fostered a series of quality-enhancing innovations, aimed at the imitation of nature (i.e., *mimesis*, which is what identified artistic quality in those times). The same Pliny associates the glory of Greek painters with the fact that they worked for cities, rather than decorating domestic interiors as in his own times (Pliny, 35, 118). Competition for more elaborate and higher-quality art increased the demand for specific skills by painters, which in turn increased the rents earned by their human capital. While the Greek *póleis* were outbidding each other to obtain works of higher quality, the prestige and social status of the artists (often employed by rival kings) improved, and the effective prices of their commissions increased. The empirical support that we can offer for this path of artistic innovations, of course limited by the paucity of the available data, relies on the increasing prices of masterpieces between the Periclean age and the peak of creativity, reached according to the literary sources with Apelles at the time of King Alexander the Great. Prices of paintings by the major artists of this period exhibit an increasing trend in the estimated year of execution, also after controlling for changes in purchasing power (Loomis 1998), differences between primary and secondary markets, proxies for the complexity of compositions, and measures of quality as perceived at the time.

The age of the city-states and of great art declined with the expansion of the Hellenistic world, starting a gradual transition toward a new era. The Roman conquest of new territories through the Mediterranean Sea reached regions that were much more advanced from a cultural point of view. This generated a new demand for artistic objects that was initially satisfied by the spoils of war, then by the production of copies in workshops employing slaves (in a constant flow from eastern provinces) and freedmen (i.e., former slaves manumitted by patrons in return for work), and finally by a florid trade of art across the Roman Empire. Since the age of Augustus, the so-called *Pax Romana* ensured peace and safe trade across the Mediterranean Sea and over a network of roads that reduced transport costs across all the imperial provinces (Flückiger et al. 2022). This created incentives for workshops to serve the demand of distant locations (for instance, shipping statues) and of middle-class customers (as evident from the remnants of Pompeii, where a large part of the houses

were decorated with wall paintings),⁵ stimulating mass production by anonymous artists, the development of cost-saving innovations, and the imitation of past art rather than the investment in quality-enhancing innovations. Artists could either ship their works or migrate where demand was higher, generating a powerful market mechanism that avoided substantial differences in art prices across the provinces of the Roman Empire. We provide evidence for this competitive process and the high level of market integration, showing that the price of statues was stable over time and, most of all, largely equalized across the main imperial provinces after controlling for their main characteristics.

In particular, we build on the works of Duncan-Jones (1982), Drinkwater (1979, 2014), and Curchin (1983, 2014), and put together a dataset of more than two hundred observations on commissions of statues from Italian regions and various provinces (mostly from Numidia, Africa Proconsularis, Asia, Hispania Baetica, Gallia, Mauretania Caesariensis, and Germania Superior). The information was engraved at the base of the statues and covered the prices of commissions, the period in which the statues were executed, the number of statues in the commissions, the destination, and, typically, the subject of the statues (of an emperor, a divinity, or a donor), the material (bronze, silver, or marble), and the dimension (small or large). Price variability is substantial but in part explained by observable characteristics, for instance higher prices for commissions of more statues, larger statues, or silver-plated statues. The nominal prices appear to be slightly increasing over time from the I century to the period of the emperors Trajan and Hadrian (98–138 AD), the Antonini emperors (138–192 AD), the dynasty of the Severans (193–235 AD), and the mid III century, but differentials (compared to cases of unknown date) are not statistically significant. Most importantly, once we control for all the observable characteristics of the artworks, the prices do not exhibit significant differences across the main areas of the Roman Empire, grouped as Numidia, Africa, Mauretania, Spain, North Europe, Italy, Greece, and Asia. This suggests that market integration was deep enough to largely equalize prices across a huge territory. We also consider a restricted dataset for which we have more precise estimates of the year of execution, and we control for changes in purchasing power (Wassink 1991): in such a case there is no trend in real prices over the entire period and again there are no significant price differentials across provinces of the Roman Empire.

⁵ Flohr (2019) has shown that the large majority of Pompeian paintings came from houses of the “subelite” (with enough rooms to be relatively wealthy compared to the rest of the community, but less than the elite) and “middling groups” (living above subsistence level as small merchants and shopkeepers).

Our analysis relates to works on the economic history of the ancient economy focused on classical Greece (Cohen 1992; Bresson 2016) and the Roman Empire (Rostovtzeff 1957; Duncan-Jones 1982, 1994; Temin 2013). With reference to art historical studies, Stewart (1990) has emphasized aspects of the social history of Greek art, and Stewart (2008) has done the same for Roman art, but with limited attention to economic mechanisms. Our work applies quantitative analysis to ancient art markets and is related to the wider literature on the economics of art history, which is largely focused on more recent times.⁶ Nevertheless, one can find similar patterns. The artistic innovations of Renaissance Italy flourished in an environment populated by a few public and private patrons competing to attract the best artists to rival towns, in a period where the real price of paintings was rapidly increasing (Etro 2018) and workshops were organized in a way that promoted artistic innovations (Piano and Piano 2023). Instead, the Dutch art market of the XVII century became closer to a large integrated market due to the unprecedented extension of demand for paintings to the middle and lower classes, which fostered mass production and cost-saving innovations (Montias 2002), with real prices of paintings that were stable or declining once the market was saturated with painters (Etro and Stepanova 2016). Our tentative claim is that similar patterns have been related to the structure of the art markets since their origins. The paper is organized as follows. The next section introduces art production in ancient times and our primary sources. Then we analyze differences between classical Greece and imperial Rome in the organization of workshops, and we draw theoretical predictions for the empirical analysis. Two separate sections present evidence, respectively, on art prices in classical Greece and in the Roman Empire. Final remarks are in the conclusion.

THE ART MARKET IN THE ANCIENT WORLD

Forms of art were developed since the creation of the first sedentary communities, which made it possible for some of their members to specialize in artistic decorations. Further institutional developments in the early civilizations of Mesopotamia and Egypt generated the demand for artistic commissions for temples and palaces. However, the monocratic authorities of those societies tended to promote massive constructions and the perpetuation of stylized celebratory art executed mainly

⁶ See Montias (2002) and Galenson and Jensen (2002) on painting, and, for an introduction, Etro and Galenson (2023). For other arts, see Borowiecki (2015, 2022) on music, and Giorelli and Moser (2020) on opera.

by slaves and anonymous artisans rather than fostering innovations by free artists.⁷ Some form of art trade must have taken place in these and more recent civilizations, such as the Minoic and Mycenaean ones, with barter involving especially pottery, armory, and jewelry. An echo of this remains in the *Iliad* (VIII century BC), where Homer describes the exchange of a golden armor of the Trojan Glaucus worth a 100 oxen with a bronze armor of the Achaean Diomedes worth 9 oxen (Book VI), and elsewhere mentions the value of various awards assigned by Achilles to the winners of contests (Book XXIII).

By the end of the VII century BC, the Aegean world was composed of a multitude of independent *póleis* led by aristocratic institutions and connected by a florid trade network and a monetary system based on the minting of gold and silver coins. Some city-states, led by Athens, developed more inclusive political institutions where private enterprise could flourish. Inter-regional trade was expanding, and soon it was even supported by the emergence of a rudimentary credit system focused on maritime loans (Cohen 1992). As argued in a definitive way by Temin (2013), it was the beginning of a real market economy whose structure would be inherited by the larger and integrated markets of the future Hellenistic and Roman worlds. A variety of crafts developed their own markets, and we have the first evidence about art trade and prices. Before discussing this, however, we need to describe the economic and monetary system of the ancient world.

Economic and Monetary System of the Greco-Roman World

Ancient Greece was characterized by intense trade between *póleis*. The monetary system was dominated by the silver *drachma* of Athens, which, since the reforms of Solon at the beginning of the VI century, corresponded to 4.33 grams of silver and was divided into 6 silver obols. The relevant units of account for our purposes were either the *mina*, corresponding to 100 drachms, or the *talent*, corresponding to 60 mines or 6,000 drachms. We have fragmentary but useful information on the real value of a drachm (Loomis 1998) between the V and the III centuries BC. It is based on the compensation of workers in classical Athens, with substantial evidence on soldiers, sailors, manual workers, public officeholders, and others. The typical wage of an unskilled worker was around a drachm and three obols per day, while skilled workers could also reach

⁷ It seems significant that the oldest among the seven wonders of the ancient world were the Great Pyramid of Giza of the XXVI century BC and the Hanging Gardens of Babylon, built at the end of the VII century BC.

three drachms per day (Bresson 2016; Loomis 1998); however, these wages refer mostly to the public sector and do not take into account other benefits and sources of income that were ordinarily added to basic wages; therefore, the effective income in the private sector may have been somewhat higher.

The comparison over time of wages for similar occupations is less speculative and has allowed Loomis (1998, ch. 15) to reconstruct the pattern of wage inflation over two centuries spanning between 450 BC and 250 BC. The period 450–432 BC was the core of the Periclean age in Athens, when the democratic institutions promoted both private enterprise and public investments, and the limited evidence suggests that there was a broad 50 percent rise in wages during this period. The period 432–412 BC appears to be characterized by substantial wage stability, followed by heavy wage cuts in the order of 50–100 percent in the period 412–403 BC, with a full recovery in the next decade. The period 403–330 BC was characterized by constant tensions and conflicts between Greek *póleis*, but with a substantial equilibrium between the most powerful ones (Athens, Sparta, and Thebes) and their allies; the evidence of this long period suggests a gradual increase of wages, with overall growth around 100 percent. The period 330–300 BC provides evidence of a further increase of 25–50 percent in compensations. Finally, the period 300–250 BC appears to be characterized by a minor drop between 10 percent and 33 percent.

In spite of the continuity between the Greek world and the Roman one in terms of culture, religion, and even urban organization of the market, centered earlier in the *agorà* and then in the *forum*, the rapid expansion of Rome through the Mediterranean Sea developed a radically different socio-economic structure. The Roman Empire became a large integrated economy with political, administrative, and military power concentrated in the hands of the emperor and extractive institutions located in peripheral provinces, but also with an efficient organization that could protect peace, legality, infrastructure, and trade for a long period and over a huge area. The so-called *Pax Romana* of the first centuries of the Empire made it possible to build a well-organized network of trade routes through the whole Mediterranean Sea and the main provinces (Flückiger et al. 2022), fostering a lively market economy (Temin 2013) and even the emergence of large-scale entrepreneurial activities, which were quite effective at minimizing costs and differentiating production (Rathbone 1991).

The Roman monetary system was inherited from the Greek one: the silver *denarius* corresponded roughly to a drachm and was divided into four brass *sestertii* (sesterces), where the *sestertius* (HS) was the main

unit of account. Accordingly, a talent corresponded to 24,000 sesterces. The system was rather stable for more than two centuries across the entire Empire. Tensions due to the bimetallic system, fluctuations of coinage, and imperial finances were common, but inflation must have been modest until the last decades of the III century. At the very end of that century, a sort of hyperinflation spread through the whole Empire. In 301 AD, the Edict of Diocletian tried to regulate prices to contrast it, but was largely unsuccessful (Temin 2013), and the crisis led to a rapid demonetization of the economy. Reconstructing a price index for the first centuries of the Roman Empire is complex, but the fragmentary time series available for the price of wheat, wine, donkey-hire, or the wage for digging or harvesting from different locations appear to suggest the presence of low inflation for most of the period. This is also consistent with changes in legionary salaries, which probably provide the best proxy for changes in purchasing power (Duncan-Jones 1994). The typical wage of an unskilled worker in the early Roman Empire was around three or four sesterces per day, corresponding to an annual labor compensation of HS 790 (Temin 2013). Wassink (1991) has advanced a price index for the first three centuries of the Roman Empire. In the period 0–64 AD, there was a 15–25 percent reduction in the price level, which was entirely recovered by 100 AD. The price level increased by 100 percent over the entire next century up to 200 AD, with a further increase of 33 percent in the period 200–215 AD. By the middle of the III century, the price level would have been three times higher than at the beginning of the period under consideration, which corresponds to a modest 0.7 percent of annual inflation on average.

The Market for Sculpture in the Greco-Roman World

The ancient Greek civilization gave birth to an unprecedented number of artistic personalities. Stewart (1990) mentions over a thousand sculptors known from literary or epigraphic sources, of which about two hundred are listed by Pliny and almost a hundred have left some substantial evidence through attributed works and Roman copies or through extended treatment by ancient sources (rarely both). However, the extant life-size Greek bronze statues are just about 30, and most of the Greek marble sculptures cannot be attributed on solid grounds. A large part of the extant ancient statues derives from the Roman world, which instead has barely left a few names of original sculptors.

The first Greek artists described by ancient sources were from the Archaic period of the VII and VI centuries BC. We have evidence of a

variety of sculptors from many different city-states on mainland Greece and the islands, a sign that there was already a common market attracting entry of artists to the area. Static representations of female and male figures were evolving through artistic as well as technical innovations. Early sculpture was often associated with idealized portraits of victorious athletes from competitions in the Olympic Games or warriors, and masterpieces of the severe period such as the “Discobolus” by Myron of Eleutheræ (today known through a number of Roman copies) or the “Riace bronzes” were in this tradition. The great sculptors of the V and IV centuries BC gradually reached, for the first time in history, a faithful representation of nature combined with idealistic values of balance and harmony. They were mostly focused on standalone statues of gods and heroes in bronze and, less often, in marble, but their workshops were also involved in the decoration of temples with mythological cycles on pediments and metopes.

The first major classical sculptor, Phidias of Athens, was the main artistic supervisor of the massive building program undertaken by Pericles in the democratic Athens of the mid-V century BC, after the Persians destroyed the old Acropolis in 480 BC. A large team of architects and sculptors was engaged for years to build and decorate the Parthenon by 437 BC, the Propylæia by 432 BC, and then the Erechtheion by 405 BC. Many inscriptions have been found with fragmentary records of payments for these decorations; while they provide evidence of somewhat differentiated fees, they are insufficient to reconstruct the prices of precise artworks. For instance, the building accounts of the Parthenon mention 16,392 drachmas paid for the pedimental sculptors (I.G. I³ 449), and those of the Erechtheion mention 3,315 drachmas paid for the marble reliefs attached to the limestone frieze (I.G. I³ 476), with different payments mentioned for each work in the order of 60 drachmas per figure, which is consistent with the earnings of ordinary manual workers. It should be stressed that reliefs for friezes and metopes were considered of secondary importance compared to standalone statues, which resonates well with the fact that Phidias was only coordinating the works on the Parthenon. He was known to earn ten times more than other sculptors (Plato, *Meno*, 91), and was certainly paid much more for the execution of the colossal chryselephantine statues of “Athena” for the Parthenon (438 BC) and “Zeus” for the temple of Olympia (435 BC). The latter was going to become one of the seven wonders of the ancient world.

In this period, the high demand for works for public buildings in Athens must have fostered the entry of new artists and competition for the

market.⁸ Pliny supports this conjecture with abundant anecdotal evidence of a competitive environment, mentioning, for instance, the contest between two disciples of Phidias, Alkamenes of Lemnos and Agorakritos of Paros, in the production of a statue of Aphrodite (Pliny, 36, 17). The same Alkamenes was paid 5.5 talents by Athens in 421–416 BC for bronze statues of Athena and Hephaistos (Stewart 2019). Another anecdote refers to a later competition between five sculptors in the production of statues of Amazons for the temple of Artemis in Ephesus, with votes by the same competitors: Polykleitos of Argos was judged second by each artist and won the contest (Pliny, 34, 53). As the art historian Stewart (1990, p. 311) puts it, “not only did sculptors compete, both formally and informally, for commissions, but their styles directly reflect this state of affairs, as each sculptor tries to outdo his predecessors and contemporaries in mimetic prowess.” When the main public works of Athens were over, many artists started supplying their services to the private sector, as confirmed by the sudden emergence of funerary *stelai* with reliefs, which had been forbidden since the beginning of the V century, and started to spread not only for the higher class, but also for the lower class. About six thousand Athenian gravestones were preserved between 430 BC and the next ban in 317 BC, and their production must have ensured a constant flow of profits for a large pool of sculptors.

In the final decades of the V century, artistic commissions continued to flourish in various city-states in spite of the Peloponnesian War. The “Diadumenos,” or youth tying a headband, was a famous bronze statue made by Polykleitos around 420 BC of the value of 100 talents, according to Pliny (35, 55). It is known from about thirty Roman copies and has the honor of being the oldest figurative artwork for which we know the author, the visual aspect, and the price. The latter was by all standards exceptional, but this statue represented a new canonical model for sculpture based on the chiasmic arrangement of relaxed and weight-bearing limbs. Moreover, we cannot exclude that Pliny mentioned a price recorded in the secondary market when the statue became a famous benchmark for later artists. Not by chance, the Polykleitan school dominated commissions in the following decades. The defeat of Athens by Sparta at the end of the V century did slow down public commissions in Athens for a few decades, but ultimately contributed to the spread of its institutional and economic organization throughout all of Greece. And new public projects flourished soon elsewhere, for instance, at Epidauros, where we know the payments of Timotheos and Hektoridas to furnish relief models

⁸ The effects of urban clusters on the productivity and creativity of artists have been emphasized in more recent periods (Hellmanzik 2010; Borowiecki 2015).

and to make akroteria for the pediments of the temple of Asklepios, built around 380 BC (though we cannot establish whether these were final payments or what was the exact entity of the works of these artists).

New heights for the arts were achieved during the middle of the IV century BC. “Well financed and apparently stimulated by the continued intercity rivalries, architects, sculptors, and painters forged a ‘second classicism’ that sought to rival the achievement of the first. In Athens, state commissions (chiefly for divine images and portraits) were fairly numerous” (Stewart 1990, p. 175). And important commissions also came from Thebes, Olympia, Delphi, Nemea, Argos, Sikyon, and many other towns, such as Halikarnassus with the construction of the Tomb of Mausolus (351 BC) and Ephesus with the reconstruction of the temple of Artemis (323 BC), both of which will join the group of wonders of the ancient world. Payments for architectural sculpture were probably increasing since Androstheneas was paid 18.6 talents for the pedimental figures of the temple of Apollo in Delphi (Seaman and Schutz 2017). The greatest marble sculptor of the time was Praxiteles of Athens. Pliny (35, 20–21) tells us that he put on sale two marble statues of “Aphrodite” for the same price: one of them was draped, while the other was not, and was probably the first full-scale female nude. The citizens of Kos, who had an option on the sale, bought the former and refused the latter. The naked Aphrodite was then purchased by the city of Knidos and became the symbol of the Knidians. Three centuries later, King Nicomedes of Bithynia offered to pay off the entire debt of the city in exchange for that statue, but the offer was rejected. Also in this case, we are talking of what was regarded as one of the greatest achievements of late classical sculpture, probably made in the 350s, and today known from a large number of Roman copies and variations.

The flourishing art market of the late IV century was fertile for artistic innovators, and the key figure of the period was Lysippos of Sikyon (about 385–310 BC), a master of realism. According to Stewart (1990, p. 186), by the 340s, “Lysippos had effectively replaced the Polykleitan school in the Peloponnese, and was in demand all over the Greek world for bronzes on almost every subject imaginable. His versatility in the medium was extraordinary, and together with his ability to make his statues ‘come alive’ through his command of detail, must clearly have been instrumental in his securing commissions from individuals, *póleis*, federal states, and last but not least Philip and Alexander,” for whom he will become court sculptor. He was also extremely prolific: according to Pliny, he would have executed 1,500 works in bronze, a number corresponding to the gold coins found by his heirs in his strongbox, each one set apart from the fee received for each statue.

A follower of Lysippus, Chares of Lindos, was responsible for the best-paid statue in ancient Greece, the “Colossus of Rhodes,” dedicated to the sun-god Helios and included among the seven wonders of the ancient world. This bronze statue was 32 meters tall, erected in 12 years, and paid 300 talents. Completed in 293 BC, it was destroyed by an earthquake at the end of the century (Pliny, 35, 41).⁹ The price was three times the price of the masterpiece of Polykleitos, though the comparison is not very informative given the peculiar nature and size of *colossi* and the large amount of bronze (and work) needed for them.¹⁰ The competition for similar commissions must have been fierce, since we know from the historian Plutarch (46–post 119 AD) that the *poleis* invited bids from artists from all of Greece to build temples and colossal statues, and scrutinized the competitors through juries that evaluated models and sketches (*Moralia*, 498). Pliny mentions a few followers of Lysippus active in the first decade of the III century, and then argues that “art ceased” (*cessavit deinde ars*, Pliny, 34, 52) and was revived only in the middle of the II century. This mysterious statement may simply refer to the end of the Greek literary sources used by Pliny. A different interpretation is that the sequence of artistic innovations had really reached its peak, and subsequent art would have only distorted the major achievements of the classical age in a baroque style or repeated them in a neo-attic style. During this period, the central role of Athens declined rapidly, also as the center of the art market (Stewart 1990). The most attractive commissions were those of Pergamon, Antioch, and Alexandria, but there are no more traces of high payments for the leading artists of the Hellenistic period.

While the influence of Hellenistic art was expanding well beyond the older circle of Greek *póleis* toward east (to reach even India with Gandhara art), most of the Greek artists were refocusing their efforts toward activities that could ensure a steady flow of earnings, such as portraits for private commissioners, small statues for domestic decorations (as the terracotta figurines of Tanagra), and others that could be easily commercialized in various destinations. Ordinary bronze portraits were in increasing demand during the Hellenistic age, and according to Stewart (2019), they were normally priced at around 3,000 drachms with a profit for the artist of about 2,200 drachms in the IV–III century BC and 2,000 drachms with a profit of 1,350 drachms in the II–I century BC. There was also a widespread demand for group patronage, “ranging

⁹ We also know the price of 800 talents for the last of the seven wonders of the ancient world, the “Lighthouse of Alexandria,” which was erected in 280 BC.

¹⁰ When a statue undergoes an increase in size of x times, its new surface area is proportional to x^2 and its new volume is proportional to x^3 .

from subscription-financed portraits of dignitaries in Athens, Rhodes, Lindos, and elsewhere (at 3,000 drs. a time) to large-scale commissions such as that awarded to Menandros of Athens by the Association of the Poseidoniasts of Berytos (Beirut) in the second-century Delos” (Stewart 1990, p. 58). Always, more workshops were focused on “garden sculptures,” which could be stocked and widely commercialized. In 167 BC, Delos obtained duty-free status under the Athenian administration and launched a fully-fledged industry of sculptural workshops exporting at the inter-regional level.

The Roman Republic had experienced a rare process in history, characterized by the gradual conquest of regions that were much more advanced from a cultural and artistic point of view. This generated a continuous flow of works of art as military plunder that served part of the demand for public buildings and for the houses of the main patrician families in Rome. Once war booties and regular imports of artwork could not satisfy the demand anymore, Rome started employing foreign artists, mainly Greek ones, to produce copies of ancient statues and decorations for both public and private buildings. According to Stewart (1990, pp. 26–27), “copyists concentrated in the major access ports of Rome: first around the Bay of Naples, then at Ostia... Importing Greek marble and often using casts supplied from Greece as models, they tended to neglect the vast mass of originals in Rome itself... To be able to please most clients, a copyist needed only to stock a few prime examples of each popular subject... Authorship was a secondary consideration at best.” The factories were engaged in mass production of copies of Greek statues, as in a case found in Baia, with remnants of 400 plaster casts (Harris 2015). In such a contest, quality-enhancing innovations were not the priority. Even Pasiteles, a celebrated Greek sculptor active in Rome during the I century BC, and his pupils Stephanos and Menelaos ventured at most in variations of pre-existing themes.¹¹

The *Pax Romana* of the first two centuries of the Roman Empire fostered trade across all the provinces, especially for precious objects. As the principle of comparative advantage would suggest, this led to the concentration of artistic production in eastern provinces with an old tradition, but there was also a steady flow of migration from these places to Rome and other provinces with large demand - Russell (2013, pp. 332–6) on

¹¹ We should remark that this did not prevent Roman sculpture from producing important works in the classical style (such as the *Ara Pacis Augustae*) and developing a naturalistic style in portraits (from funerary ones for freedmen to imperial portraits) as well as continuous narrative reliefs on columns and arches (evolving beyond the traditional concept of *mimesis*). However, these advances were either built on earlier developments of Hellenistic sculpture or remained occasional results by near-anonymous artists (Kleiner 1992).

migrant and itinerant carvers. The historian Suetonius (69–post 122 AD) reports that the exploitation of marble quarries at Luna allowed Augustus to turn Rome from a city of brick into one of marble and promoted local sculpture. But Kleiner (1992, p. 4) emphasizes that “the names of Roman artists, be they native Italians or, as was more usual, men from Greece or Asia Minor, are rarely recorded. This is probably because Roman artists were of low social status since they came from slave population or from the freedman class and were considered mere artisans. Such was the fate of both the greatest artists of the day who worked in the emperor’s court and of the lowly stonecarvers employed in workshops producing sepulchral reliefs.” Even the Roman emperors, who were spending large resources on the magnificence of Rome, did not appear to pay too much attention to the artistic quality and novelty of sculpture.

By the II century AD, the entire Mediterranean Sea was the stage of an unprecedented trade in statues and sarcophagi,¹² directed not only to Italy but to all the provinces of the Empire, especially the most “Romanized” ones, such as those in Africa, Spain, and Gaul. Temples, forums, and baths in most of the towns of the Empire were decorated with statues commissioned by public and private patrons, often shipped from workshops based in other places. Part of the production was completed at the destination; most reliefs were sketched before shipping and finalized only at the arrival to limit risk and adapt the details to the needs of heterogeneous patrons. The statues could be either in bronze or in marble, and the subjects included gods, emperors, and the same donors. While many of these statues were lost or removed over the centuries, we have records of thousands of them from inscriptions left at the bases of the statues around all the provinces of the Empire between the I and the III centuries BC. In some cases, we also have detailed information on the commissions of those statues (Friedlander 1913; Duncan-Jones 1982; Drinkwater 1979; Curchin 1983). These epigraphic documents provide a unique source of information on the art market of the Roman Empire, and we will exploit them next. By the end of the III century, the Empire entered a period of military and economic crisis; also, the production and trade of statues started to decline, as witnessed by the lack of price records for this period and Late Antiquity (Smith and Ward-Perkins 2016). This was a symptom

¹² The interest in sarcophagi was promoted by the change of burial practice from cremation to inhumation. The most important workshops were in Rome, Athens, and Asia Minor, and the five thousand sarcophagi that survive today are mostly decorated with hanging garlands, mythological subjects, battles, and biographical stories. They were not only destined for upper-class patrons, but also for freedmen. We only know the price of a limestone and undecorated sarcophagus from Salona in Dalmatia, probably made in the late III century AD and sold for about 600 sesterces (Russell 2013).

of a genuine artistic decline: after decades of mass production of imitative statues and standardized sarcophagi by an industry of anonymous carvers, the reduction of public commissions for major statues or large-scale relief sculpture led to a gradual loss of knowledge of old techniques and traditions.¹³

The Market for Paintings in the Greco-Roman World

We have lost almost all the works of ancient Greek painters, but not the information on them. Pliny mentions about 140 painters and provides detailed information about a substantial group that can be integrated with other literary sources. Also, in this case, the Roman Empire has left behind more paintings, but only a few names of original artists. Pliny starts his history of painting at some point between the end of the VIII century BC and the beginning of the VII century, when the king of Lydia Candaules purchased a “Battle of the Magnetes” by the ionic artist Boularchos for its weight in gold (Pliny, 35, 55). Such vague information on the value of the work is probably aimed at stressing that there was already demand for high-quality art. The only aid for our visual imagination of early painting derives from drawings on archaic vases, mostly from Corinth and Athens: vase painting was characterized by an embryonic form of competition between the best artists, suggested by the first signatures left by about a hundred of them to promote their own supply.¹⁴ Large-scale painters must have been competing to attract commissions by differentiating their production. A first innovator of this period was Cimon of Cleonae, probably active in the VI century BC, who introduced foreshortenings (*katagraphia*): according to Aelian (175–235 AD), for this reason “he also received a greater reward than the painters that were before” (*Varia Historia*, 8.8). Artistic innovations spread rapidly across Greek *póleis* and their colonies (an echo can be even found in the decorations of Etruscan tombs).

The subsequent evolution brought the great masters of the V and IV centuries BC, for which we have more information. The first important artist was Polygnotus of Thasos (about 500–440 BC), who probably moved to Athens in the third decade of the V century BC. His first known commission was for a monument built after the battle of Plataea (479

¹³ This was the twilight of the pagan world before the new Christian world (formalized with the Edict of Milan in 313 AD) started to build its own artistic traditions.

¹⁴ More than a thousand signatures have been found on Attic vases between the VI and V centuries BC (Seaman and Schutz 2017). Also, signatures by other artists originated in the VI century, and it has been emphasized that the practice started in Attica right after reforms by Solon gave a boost to artisanal activities.

BC), where the alliance of Greek *póleis* defeated the Persians. The project was financed by 80 talents for the construction of a sanctuary for Athena, a statue by Phidias, and paintings by Polygnotus and Onasias: most of the spending was certainly destined for the construction works and the statue. After other public commissions for Athens, Polygnotus became a key figure in the circle of the statesman Kimon, and around 470/460 BC he received a commission for the decoration of a portico in the *agorà*, the so-called *Stoà Poikile* (literally the painted portico), together with two local painters, Mikon and Panaenus, the brother of Phidias. The panel by Polygnotus represented the sack of Troy, or “Ilioupersis,” while Mikon painted a panel of equal size representing the battle of Theseus and the Athenians with the Amazons, or “Amazonomachiai.” It has been suggested that the size of each panel was about 20 square meters, and the work of Polygnotus contained up to 20 figures displayed along two rows, as is typical of contemporary vase painting: see Roscino (2010), whose schematic reconstruction of the sack of Troy presents 13 standing figures. Pliny tells us that Polygnotus was not paid for this panel, while his partners were regularly paid for a third one representing the “Battle of Marathon,” since Mikon was also fined 30 mines for depicting Persians in the foreground taller than the Greeks (probably with the simple aim of respecting intuitive rules of perspective). However, Polygnotus obtained Athenian citizenship, which was extremely valuable because it gave him the right to own land in Attica, avoid the taxes on metics (foreign residents), and access political institutions. He was also awarded free hospitality by the league of Greek *póleis* based in Delphi, and in the town of the Delphic Oracle, around 466 BC, he painted a cycle in the Lesche of the Knidians (Pliny, 35, 59). The later description of this cycle by Pausanias (a geographer of the II century AD) suggests that this was a wider composition on multiple walls, including an “Ilioupersis” and a representation of the visit of Odysseus to Hades or the “Nekyomanteia,” both of which were richer in figures than earlier versions (traditional reconstructions reported in Roscino (2010) count more than 60 figures in each composition), and probably had been well paid by the rich Knidians. The anecdote suggests a fact of crucial importance at the beginning of the classical age: various Greek city-states demanded works by the main artists and were ready to compete for their services. This competition must have gradually increased the prestige of painters, their payments, and their incentives to create better artwork than their rivals. Such a mechanism was typically Greek: a basic competitive channel could not emerge in other ancient civilizations where a unique centralized political power was allocating artistic activities. And it led to conceptual and technical innovations, such

as new methods to reproduce shadows and perspective or the introduction of easel paintings.¹⁵

The next major painter was Zeuxis of Heraclea, probably the town of Heraclea Minoa in Sicily (Moreno 1987). He was active between 430 BC and 394 BC and focused most of his production on easel paintings. Apparently, Zeuxis earned so much money from his profession that he used to parade around Olympia with his name decorated in gold on his cloak (Pliny, 35, 62). He even started to give away his works for free with the excuse that there was no high enough price for them, and in particular, he gave an “Alcmena” as a gift to the rich town of Akragas in Sicily and a “Pan” as a gift to Archelaus I, king of Macedon from 413 to 399 BC. These facts mentioned by Pliny are quite telling. First of all, the production of easel paintings on panels is ideal to develop a secondary art market. Second, the fact that Zeuxis became rich from his activity suggests that there was not any negative perception of producing art for money and that paintings were in high demand, which may have contributed to fostering the innovations of this period as well as competition between painters: anecdotes on contests between artists abound and the same Zeuxis was accused by the rival Apollodorus of stealing his original techniques. Third, Zeuxis was advertising his work with the likely purpose of reaching a double role as a court painter and an entrepreneur producing for various patrons. This was not in vain, since he received commissions from Ephesus and city-states of Sicily. According to Cicero, lawyer and statesman of the I century BC, he was also hired by the town of Kroton to decorate a temple of Juno; people were charged to see it, and Zeuxis made a lot of money from this “exhibition” (*De Inventione*, 2, 1, 1). At the end of his life, Archelaus I brought him to his court in Pella (together with other artists and poets, including Euripides). The rivalry between Zeuxis and the next leading painter, Parrhasius of Ephesus (active in the early IV century BC), was the subject of a famous contest. Zeuxis had painted grapes so well that birds were fooled and flew down to them. Then, Parrhasius challenged Zeuxis, bringing him to his workshop to show a curtain on a panel. Zeuxis was so sure of winning the contest that he asked Parrhasius to draw aside the curtain. But realizing that the painting was actually reproducing the curtain, Zeuxis declared

¹⁵ Apollodorus of Athens, active in the early V century, introduced the new technique of *skiagraphia* to better reproduce shadows. He was probably one of the first artists to specialize in easel paintings on panels, called *pinakes*, and many followers adopted and extended some of his innovations. For instance, in the mid-V century, Agatharchos of Samos developed the *skenographia*, which was aimed at reproducing a realistic perspective. Similar techniques were probably used for the scenography of tragedies by Aeschylus and were then exploited in the golden age of classical drama with Sophocles.

the victory of Parrhasius. If this anecdote suggests something, it is not the ability of these artists, but the crucial role of competition in reproducing nature (*mimesis*), which was the measure of artistic quality at the time.

The main artistic schools of the mid-IV century were based in Athens and Sikyon, and their focus was on strengthening realism in painting. Famous artists of this period included Pausias of Sikyon (active around 380–330 BC), often engaged in small still life paintings, Kydrias of Kythnos (mentioned as a contemporary of Euphranor, who flourished in 364–361 BC), engaged in landscapes and mythological paintings, and Nicomachus of Thebes, the likely author of the fresco of the “Abduction of Persephone” for the Tomb of Philip II of Macedon, executed at the death of the king in 336 BC, and still visible in Vergina. Nichomachus painted a portrait of the king Antipater for a high fee, and executed it in 40 days, which induced the king to complain: the answer of the painter was that he did not execute it in 40 days but in 40 years of a career (Moreno 1987).¹⁶ His followers included the son of Aristides, who was one of the first artists able to express the feelings of human beings (Pliny, 35, 98). Unknown is instead the name of the contemporary painter of the best fresco left from this period, still visible in a Macedonian tomb of Agios Athanasios, with portraits of two soldiers, a banquet scene, and a procession. The literary sources agree that the perfection of painting was reached in the second half of the IV century by Nicomachus, Aetion, Melanthius, and Apelles, whose works could be sold individually for the treasures of whole cities (Pliny, 35, 32). In particular, Apelles of Colophon (in Asia Minor) was recognized as the most acclaimed artist. Born around 375 BC, he studied in Ephesus and Sikyon before moving to the court of Philip II, where he became the painter of Alexander the Great, who apparently accorded Apelles, Lysippos, and the gemcutter Pyrgoteles the exclusive right to depict him in each respective medium. Once again, the existence of competition between painters is presented by the sources through anecdotes, such as those about Apelles and Protogenes of Caunus, active on the free island of Rhodes around 330–290 BC. Besides working for Alexander, Apelles also worked for his former general and ruler of Egypt, Ptolemy I, in rivalry with Antiphilos.

We do not have much information on painters during the Hellenistic period, except for a few names, such as Kratinos and Nealkes, active in the III century, and their respective daughters Eirene and Aristarete, possibly active in the early II century. The conquests of Alexander and the subsequent developments of the Hellenistic kingdoms expanded the

¹⁶ Another link between art prices and market conditions is emphasized by Pliny (35, 145), who notices that the paintings left unfinished at the death of the artists had a higher value.

market to an international dimension; many artists started to produce for other regions and migrate where there was demand. Pliny emphasizes the strength of this phenomenon, mentioning the migration of a female painter, Iaia of Cyzicus, who moved alone to Rome in the early I century BC.

Pliny mentions only one painter who reached fame in imperial Rome during his own time: “Recently there was the serious and severe, but at the same time overly florid painter Famulus. By his hand there was a Minerva which continued to face the viewer no matter what angle he looked at it. He used to paint for only a few hours a day, but this was done with great gravity, since he always wore a toga, even when he was in the midst of his painter’s equipment. The *Domus Aurea* was the prison for his artistry, and for that reason there are not many other examples of his work extant” (Pliny, 35, 120). We do not know anything else from other sources about this artist active under Nero. His name, Famulus, means “servant” or “slave” in Latin, suggesting that he was a freedman and that his peculiar attitudes may have been an attempt to emphasize his new status and reputation (Stewart 2008). By saying that Famulus was painting a few hours a day with a toga, Pliny may have alluded to the fact that he was a sort of conceptual artist who directed the works of a team of assistants. This supports the presumption that painting was regarded as a relatively minor form of decoration in imperial Rome, delegated to slaves and freedmen of foreign origins, with rare opportunities for the emergence of a competition between free artists that could foster artistic innovations. A related point had been made by Cicero in his *Tusculanae disputationes* (I, 2, 4) with his famous claim that Romans would have had their Polykleitos and Parrhasius if they had considered sculpture and painting as respectable professions. And this is confirmed by the view of Pliny (35, 20) that in the Roman Empire, “painting was not looked upon as a suitable occupation for respectable hands.”

Pliny died in 79 AD in an attempt to rescue a friend from the dramatic eruption of the Vesuvius, which buried Pompeii. Centuries later, the rest of the town was rediscovered, well preserved under the ashes. The subsequent excavations provided a unique snapshot of the paintings and the artistic decorations of its domestic environments, accumulated between the II century BC and the I century AD, frozen as they were at the moment Pompeii was buried. This and other rest from the nearby towns of Herculaneum and Stabiae, together with comparable findings in Rome, Ephesus, and other parts of the Empire, have made it possible to reconstruct the broad development of Roman painting in this period, which appears largely inspired by contemporary Greek painting. There

is no evidence of prices in this period, but we can infer some information on the demand for paintings from a broader analysis of the artistic decorations in Pompeii. Flohr (2019) has analyzed the distribution of excavated houses by size and type of artwork. The most common decoration was represented by wall paintings, which were present in a majority of houses, including those of the middle class. Instead, the most exclusive decoration was represented by fine mosaics in *opus vermiculatum*, which were found only in 15 houses and 3 villas of the elite, and with a skewed distribution also in these buildings (since 10 mosaics were found only in the *House of the Faun*, representing a large majority of the 35 mosaics found in the entire town, and 10 houses had just one mosaic each). This suggests that painting represented a rather popular and cheap form of art decoration, demanded also by the middle class and supplied at the local level in a town of medium size such as Pompeii. Instead, fine mosaics were rarer and probably purchased from other artistic centers or completed *in situ* (on the basis of imported drawings) by workers specialized in this task.¹⁷

THE ORGANIZATION OF ART PRODUCTION IN CLASSICAL GREECE AND THE ROMAN EMPIRE

Art production in ancient Greece was organized by master artists through workshops. There was a system of apprenticeship for most craftsmen, including the artists, and we can reconstruct the network of masters and scholars linking most of the sculptors and painters mentioned in ancient sources.¹⁸ Pliny explicitly mentions the case of the Macedonian painter Pamphilos of Amphipolis (active between 390 BC and 340 BC), who was paid 500 drachms a year by his pupils, including Pausias, Apelles, and Melanthios, to provide basic lessons in painting, arithmetic, and geometry (Pliny, 35, 76). As stressed by Stewart (1990, p. 56), the sculptors “were entrepreneurs, operating like other crafts from a shop (*ergasterion*) that could be as large or as small, as fixed or as mobile, as occasion and demand required. *Techne*, as taught by the master-pupil system provided a solid grounding and points of future reference, but never precluded individual enterprise. In fact, the competitiveness of Greek society tended to encourage it.” And a similar argument would apply to painters, who engaged in an itinerant life across *póleis* to provide

¹⁷ In the following centuries, mosaics will spread as an important form of decoration throughout the entire Roman Empire. Later on, they will rise from floors to walls and vaults, where they will be inherited by Christian art.

¹⁸ The historical account appears consistent with a deep impact exerted by the masters on the style and productivity of their scholars, as also found in more recent periods (Borowiecki 2022).

their services for the major public commissions.¹⁹ In the case of complex projects, there was a real team of master artists in collaboration, as was the case for Skopas of Paros sharing the decorations of the Mausoleum of Halikarnassos with Leochares, Bryaxis, and Timotheos. All the known masters of classical Greece were freeborn (Pliny, 35, 77), and, actually, painters such as Zeuxis, Parrhasius, and Apelles were believed to own slaves (Seaman and Schutz 2017, p. 17). As in other artisanal activities, slaves could be employed, but their role must have been confined to minor tasks, as was possibly the case in Phidias' workshops. The allocation of resources was already standardized; as noticed by Bresson (2016, p. 189), "the construction of sanctuaries in the Classical and Hellenistic periods (at Epidauros, Delphi, Eleusis, the Parthenon, Delos) show that the mode of remuneration was a function of the type of activity involved. Those who provided more specialized work were paid by the piece, whereas unskilled workers were paid by the day." In the works for the Erechtheion carpenters and sawyers were paid by day, masons and (encaustic) painters were paid by measure, sculptors, (wood) painters, and woodcarvers by piece and architects by salary, and we can guess that the contractual option was selected to optimize the incentives of the workers.

In the Roman Empire, guilds were active in various fields (Temin 2013, pp. 108–10), but there is no evidence that they controlled prices or that they were present in artistic professions. The organization of art production was based on workshops that were mostly composed of freedmen and slaves (Stewart 2008; Harris 2015). There is evidence of a workshop of mosaicists, including four freedmen, in the Albani Hills near Rome and of a workshop of painters in Castricio Street in Pompeii (Harris 2015). Flohr (2019) has estimated the demand for paintings by analyzing the distribution of almost a thousand pictures found in about two hundred buildings in Pompeii: in three-quarters of the cases, the decoration was limited to one or two rooms of the house, while only two houses have more than ten rooms with paintings. Taking into account lost works from destroyed upper floors and unexcavated parts of Pompeii, Flohr (2019) estimates that the demand for panel paintings in Pompeii could have been around a hundred per year, which would justify the activity of a local workshop or at most two competing workshops in the neighborhood (and the epigraphic evidence attests to the activity of painters in nearby Puteoli and Surrentum). This evidence suggests that a city of a million

¹⁹ While classical Greek sculpture and painting were mostly directed at public commissions, there was a parallel demand for decorative art from an anonymous middle class, which did generate mass production of painted vases for a Mediterranean market (Seaman and Schutz 2017).

inhabitants such as Rome must have hosted many more workshops, employing many freedmen and slaves in standardized decorations, which were demanded not only by patricians, but also by the middle class of merchants and shopkeepers. And the same would have happened in many other towns in all the provinces of the Empire, where remnants of similar wall paintings have been found. We also have evidence of workshops of sculptors and mosaicists active across the Roman Empire, often shipping statues and drawings for mosaics through the Mediterranean Sea, as was the case for sculptors based in Aphrodisias in Asia Minor and mosaicists whose works have been found in public and residential buildings spread around all of the Empire.

We have some information on the ordinary activity of the artists, their costs, and their contractual agreements. Bronze statues were commissioned at prices that internalized the cost of metal, but left space for adjustments: classical Greek sculptors used alloys with mere traces of lead and an abundance of tin, which was more expensive, while later Hellenistic and Roman artists often decreased the percentage of tin, used thinner walls to reduce the amount of metal used, and introduced other cost-saving techniques.²⁰ Paintings were originally based on a few colors, and classical Greek painters gradually introduced new varieties of colors; instead, Roman painters introduced cheaper versions of the most expensive colors, such as a lower-quality blue (Ling 1991, p. 209). Vitruvius and Pliny inform us that the patrons were usually paying for expensive colors, which were the so-called “florid” pigments, while the painters were responsible for the cheaper “dry” pigments. Nevertheless, more flexible arrangements were also possible: Ling (1991, p. 217) mentions a Greco-Egyptian papyrus of 255 BC where a painter proposed a price of 30 drachmae excluding costs or, in alternative, a price of 53 drachmae including costs for the same work: We do not know what was the final choice of the patron, but basic principles of contract theory suggest that incentives to deliver high-quality work would have been stronger in the former case and incentives to reduce costs in the latter.

Painting techniques of the Greco-Roman world included secco and fresco painting, tempera, and encaustic (hot wax) painting. Easel paintings were typically executed by a single master in the workshop. Instead, wall paintings were usually executed on the spot by a team, which in the Roman world included an organizer of the works defined as *pictor*

²⁰ The techniques introduced in the late Hellenistic age are described by Stewart (2019): “substituting lead for tin would have helped, since it was far cheaper and easier to obtain, but so too would using recycled bronze scrap, speeding up production, replacing profit-sharing free workers with slaves, taking on more commissions, and achieving economies of scale.”

et praepositus pictorum, a leading painter for the main figurative works named *pictor imaginarius*, a painter specialized in landscapes and decorations named *pictor parietarius*, a plasterer and assistants. While Greek art developed the individual production of easel paintings also for the most exclusive environments, which fostered by its nature the development of a secondary art market, Roman painting was almost exclusively wall-painting carried out on plaster and covering the entire walls of private houses, which limited the development of a secondary market. Moreover, the best painters were commissioned specific works in Greece and paid for them, while payments per day were common for the painters of the Roman world: the difference again is crucial, since direct competition for sequential commissions tends to incentivize quality and artistic innovation, while the provision of labor paid on a daily basis tends to penalize quality and incentivize repetitive tasks, such as the replica of the same or similar subjects on multiple frescoes (also using the same drawings).

Classical Greek art was largely focused on idealized mythological and historical subjects. Hellenistic art started to diversify the supply toward other subjects, but it was Roman art that exploited all the opportunities for product differentiation, in particular in painting. Large figurative paintings, called “megalographic paintings,” were commissioned by temples and other public buildings in ancient Greece, and the tradition continued in Rome, also for domestic decorations and largely through replicas of classical compositions. Besides this, Roman art developed further the specialization in the minor genres, from portraits (realistic and also for the lower class, as was the case in sculpture), to landscapes (including cityscapes, marine and harbor views, and more), genre paintings (including scenes of daily life, as well as burlesque and erotic subjects), and still life paintings (including fruits, flowers, birds, fishes, dead animals, and other *trompe-l’œil* subjects). As in other subsequent periods of art history (Montias 2002; Etro, Marchesi, and Pagani 2015), specialization in genres and also in particular subjects became an efficient way of allocating work within workshops, generating scale economies in repetitive tasks.

The economic and social background of the master artists was different between classical Greece and the Roman Empire. In Greece, it was associated with the middle class of free citizens, as shown by the mobility of the master artists across city-states and their occasional elections to priesthoods and magistracies. We also have evidence that famous artists were close with intellectuals, and they often interacted with the elite. Polygnotus was the lover of the sister of the Athenian statesman Kimon; Phidias was a good friend of Pericles and the philosopher Anaxagoras; and Praxiteles’s family married into the Athenian aristocracy. Many

artists wrote treatises on art theory. Parrhasius mingled in Socratic circles, and the same Socrates belonged to a family of sculptors and had probably been trained in the art. Ironically, speaking in the dialogues of Plato (as the *Republic*, written around 380 BC), Socrates excludes the arts from the ideal State because they just involve imitation of nature. However, the wide space dedicated by Plato to art in his writings suggests that he was not considering it as any other craftsmanship. Aristotle moved to the court of Philip II of Macedon in 343 BC to tutor the son Alexander, and there he must have been in close contact with leading artists such as Lysippos and Apelles, who were treated as peers by the same Alexander. Indeed, Aristotle had a much more positive view of the arts in his *Poetics*, written around 335 BC. The social status of the artists changed in the Roman world.²¹ The negative connotation associated with sculpture was a concrete burden: Plutarch claimed that no noble young, upon seeing Zeus at Olympia or Hera at Argos, would desire to be either a Phidias or a Polykleitos, and Lucian was expressing a similar concept in the middle of the II century AD. Most of the tombs of artists in Italy refer to freedmen or eastern slaves, and important families had slaves who were specifically employed in services concerning handicrafts and painting (*Digest*, XII, 6, 26, 12). Patricians and intellectuals would occasionally paint as amateurs, but the professional workshops were populated by anonymous craftsmen.

The contrast between classical Greece, where market forces led artists to work where they would get the best deals, and the Roman world, where artists produced works to be traded in the open market, was particularly clear in sculpture. A lively piece of evidence comes from a novel written by Philostratus around 238 AD about the *Life of Apollonius of Tyana*, a philosopher of the I century AD:

“When [Apollonius] descended to the Piraeus, he found a ship riding there with its sails set, just about to start for Ionia; but the owner would not allow him to embark, for he wished to go on a private cruise. Apollonius asked him what his freight consisted of. ‘Of gods,’ he replied, ‘whose images I am exporting to Ionia, some made of gold and stone, and others of ivory and gold.’ ‘And are you going to dedicate them or what?’ ‘I am going to sell them’ ... ‘And may I remind you, most worthy man,’ answered Apollonius, ‘for you appear to me to be an Athenian, that on the ships which your countrymen employed against the barbarians, although they were full of a disorderly naval crowd, the gods embarked along with them ... But the image-makers of old behaved not in this way, nor did they go round the cities selling their gods. All they did was to export their own hands and their

²¹ It should be noticed that the scarcity of source material for the Hellenistic era and the disappearance of notable artists in the accounts of Pliny and other historians suggest that already in that transitional period there must have been a decline in the social status of artists.

tools for working stone and ivory; others provided the raw materials, while they plied their handicraft in the temples themselves; but you are leading the gods into harbors and market places ... that is a horrible commerce."²²

Theoretical Predictions

We have emphasized major differences between art production and innovation in classical Greece and during the Roman Empire. While these periods had much in common in terms of cultural values and socio-economic organization, it is also clear that multiple factors may have shaped the different evolutions of artistic creativity, and an empirical analysis cannot identify the role of all these factors, let alone the causal components, with the limited data available from ancient markets. Our more modest goal is therefore to emphasize a structural difference between art markets in classical Greece and the Roman Empire, advance a plausible mechanism through which it may have affected the paths of artistic evolution, and verify whether its implications for art pricing are consistent with the evidence. The structural difference is about the size of the relevant art markets, and the mechanism is about the kind of artistic production and innovations that markets of different sizes could promote. Theories of cultural economics, starting with Cowen and Tabarrok (2000), have often emphasized that market size affects the incentives to generate art that appeals to elite vs. mass tastes and contributes to determining the kind of innovations in which artists invest. Small markets with demand driven by a few wealthy patrons for original works tend to promote investment in quality-enhancing innovations to reach high price commissions, while large markets with demand driven by a mass of anonymous buyers tend to be biased towards reproducibility, which encourages cost-saving innovations and discourages originality. Here we provide a similar insight with a stylized model of artistic evolution.

Let us consider a representative workshop investing in a quality-enhancing activity and a cost-reducing activity, denoted respectively with the Greek letter ϵ_t and the Latin letter i_t at time t . In each period, the workshop bears a positive sunk cost $F(i_t)$, which is increasing and convex in the investment aimed at reducing the marginal cost, for instance, to set up a larger factory, employ more slaves, or find new ways to reproduce art at a low cost. The unitary cost of an artwork $C(\epsilon_t, i_t)$ is increasing and convex in the quality-enhancing investment, for instance, aimed at technical, stylistic, and compositional innovations, and decreasing and

²² Translation from Philostratus (2005), *Life of Apollonius of Tyana*, V, p. 20. Cambridge: Harvard University Press.

convex in the cost-saving investment. The demand is reflected in a price function, $P(q_t)$ which represents a willingness to pay, increasing and concave in the quality q_t of artworks as perceived by patrons. The equation of motion for artistic quality depends on the accumulation of innovations transmitted over time through apprenticeship within workshops, or:

$$q_t = \lambda q_{t-1} + \epsilon_t$$

where $\lambda \in [0,1]$ is a rate of quality transmission net of obsolescence of old techniques and traditions. The market size L determines how many artworks are sold, generating the profits of the representative workshop:

$$\pi_t = [P(q_t) - C(\epsilon_t, i_t)]L - F(i_t)$$

to be maximized with respect to ϵ_t and i_t in each period, taking as given past quality. We denote derivatives with subscripts and assume $C_{\epsilon_i}(\epsilon_t, i_t) \geq 0$, so that cost-reductions tend to be harder for higher quality art. Assuming interior solutions, the equilibrium investments satisfy:

$$P_q(q_t) = C_{\epsilon}(\epsilon_t, i_t) \quad \text{and} \quad |C_i(\epsilon_t, i_t)|L = F_i(i_t)$$

The first condition equates the marginal benefit of the investment in quality to the marginal cost per artwork, and the second equates the marginal benefit of cost reductions over all sales to their marginal cost. Together, they determine the evolution of art quality q_t , which, under standard regularity conditions, converges to a steady state with stable quality \tilde{q} and delivers the comparative statics $\partial \epsilon_t / \partial q_{t-1} < 0$ and $\partial i_t / \partial q_{t-1} \geq 0$, implying the stability condition $\partial q_t / \partial q_{t-1} < 1$. In such a context, the evolution of art history is initially associated with major artistic innovations aimed at monetization by rapidly increasing prices, which then implies decreasing quality-enhancing investments and increasing cost-saving investments while art prices converge to a stable level. More important for our purposes is the comparative statics with respect to the market size L , implying $\partial \epsilon_t / \partial L \leq 0$ and $\partial i_t / \partial L > 0$ under our assumptions. A small market size generates low investments in cost reductions and high investments in quality enhancement, with prices increasing at a fast rate, especially when the willingness to pay is particularly sensitive to quality. Instead, a large market size stimulates investments in cost reductions because these are spread through more sales and decreases investments in quality enhancement, speeding up convergence to stable prices across an integrated market.

Empirical Implications

The classical Greek world was small but rich. Estimates discussed in Bresson (2016) suggest a population of 200/250 thousand inhabitants in Attica, 3 million people on mainland Greece (including Macedon), and less than that in Greek-speaking towns across the Aegean Sea and other colonies. The artists could serve the demand of the main city-states, with patrons who were directly competing to attract the best works within a relatively small region. Given the public nature of Greek paintings, and the fact that they were hard to reproduce cheaply (and had a resale value), this market was biased in favor of elite tastes. And taste for more elaborate, higher-quality paintings was growing over time (because of competition for prestige, growing patron demand, and learning by the artists); this led to an increase in the derived demand for specific skills by top artists and in their earnings. The subsequent Hellenistic world represented a sort of *trait d'union* between the Greek and Roman worlds and was characterized by an expansion of the size of the market and a gradual emergence of workshops focused on vast production for wide commercialization. The Roman Empire developed an even wider and well integrated market. Estimates discussed in Temin (2013) refer to a population of 55/70 million people. In such a context, large workshops could serve the demand of an anonymous mass market distributed around the entire Mediterranean Sea by either shipping their products or migrating where there was more demand.

Different empirical predictions emerge for our two main periods. As we have emphasized, the rich communities of the Greek *póleis* competed to obtain artworks of higher quality, which fostered the entry of new artists and, most of all, competition for the development of a series of product innovations (new techniques and novel ways to create illusionistic painted and sculpted images). While public and (major) private commissioners were outbidding each other to attract the best artists, new heights of artistic creativity were reached, and the market value of masterpieces had to increase over time. Our empirical analysis in the next section verifies this hypothesis by focusing on major paintings by top artists for leading commissions in classical Greece, on which we have records between the V century BC and the beginning of the III century BC. The fact that these are famous works by famous artists (literally) surviving the test of time through their mention in literary sources (even if the actual works did not survive) is what makes our dataset consistent with our focus on the maximum achievements of artistic creativity. Similar conditions appear in later periods of art history when competition

among local elites fostered increasing art prices and a steady flow of quality-enhancing innovations, as notably during Renaissance Italy with competition between patrons of different towns, in London at the end of the XVIII century with competition between rich collectors, and in Paris after the liberalization of art exhibitions at the end of the XIX century with competition between rival dealers.

The Roman Empire featured a much larger and integrated economy where all the provinces around the Mediterranean Sea were connected by safe maritime trade. The demand for artworks derived essentially from all the provinces, in spite of their heterogeneity in wealth and traditions, and this promoted competition to serve this demand by shipping works or directly migrating where the works were needed, fostering process innovations (cost-reducing techniques, employment of slaves, copying, and product differentiation). Cost-saving investments for mass production were more profitable in a large market than investments in quality-enhancing innovations. This should have led the market value of traded artworks to be stable (or decreasing over time as a consequence of efficiencies in production). Most of all, the prices for similar artworks should have been largely equalized across the different provinces; otherwise, market forces would have eliminated the remaining price differentials. Our empirical analysis will verify these hypotheses on statues commissioned between the I and III centuries AD in towns distributed across the Roman provinces. The information derives from inscriptions found at the bases of the statues, while the actual statues were subsequently removed or lost. The patrons could be either public institutions or private donors from various provinces. The fact that these are inscriptions that survived the test of time (even if the statues and the names of the artists did not) across a huge territory appears consistent with the idea that the sample is representative of these commissions. Also in this case, we should mention that similar conditions appear in later periods of art history when large art markets led to mass production, featuring stable (or decreasing) art prices and a continuous process of entry of artists engaged in product differentiation and cost-saving innovations, as in the Dutch golden age with a new demand of paintings by the middle class, or in Paris during the early XX century with a new international demand for modern art.

EVIDENCE ON THE PRICE OF PAINTINGS IN CLASSICAL GREECE

The earliest records for commissions of paintings in ancient Greece concern the primary market. We already mentioned works depicting episodes from the *Iliad* and an Amazon battle in the *Stoa Poikile* of Athens

around 470/460 BC. While the first one by Polygnotus was not paid, we know that Mikon was fined half a talent for depicting the Persians as larger than the Greeks. Assuming that the composition of the battle was equally divided between the two armies and that the punishment was proportional to the original payment, it does not seem unreasonable to conjecture that a talent could have been the price initially agreed for the entire composition. This would also resonate well with the order of magnitude of the compensation received by Polygnotus for his earlier commission after the battle of Plataea.

Pliny mentioned two paintings sent by Zeuxis as gifts to the town of Akragas and to the king of Macedon, which we can tentatively date around 410 BC. Also in this case, the artist was probably looking for a subsequent return, which did arrive. According to Aelian (*Varia Historia*, 14.17), the painter went to the Macedonian court of Archelaus I for a decoration of his palace at Pella and was paid 400 mines for a work, the first clear record for the payment of a painting in history. This could be tentatively dated around 400 BC, given the information by Pliny on when the painter reached his acme. The price was about 6.6 talents, and since Zeuxis was mainly a panel painter of few figures, we can conjecture that the payment must have been for an easel painting. Later mosaics left in Pella, typically representing at least a couple of human figures, may have reflected the style or even the composition of such a painting (Moreno 1987).

One of the best-documented Greek painters in terms of transactions is Aristeides of Thebes, who was active around 360–310 BC. He painted a “Battle with Persians” featuring a hundred men, each one paid ten mines by Mnason, the tyrant of Elatea between 338 and 297 BC, for a total of 1,000 mines or 16.6 talents (Pliny, 35, 99). The same Mnason purchased two other paintings, agreeing on a fixed price per figure. A painting of mythological “Heroes” by Theomnestos was paid 20 mines per hero. A painting of “Twelve gods” by Asklepiodoros of Athens, who was rated as the major Athenian painter of his age by Plutarch and was admired by Apelles, was paid 30 mines per deity by Mnason, for a total price of 6 talents. The number of heroes was probably intermediate among the 12 gods and 100 men, but closer to the former given the available number of heroes in Greek mythology: a total price of 10 talents would emerge, conjecturing 30 heroes. According to Pliny, Aristeides and Asklepiodoros flourished around 332–329 BC, which could be the period of these three commissions from Elatea. It is also possible that the paintings, at least the two by Asklepiodoros and Theomnestos, which were jointly mentioned by Pliny, were also of similar size to be complementary in the decoration

of the same room in the palace of the tyrant. The payment per figure was a natural way of incentivizing effort based on a quantifiable feature of the painting, as it will be in later centuries (see Etro and Pagani 2012). Moreover, the price per figure was directly related to the intrinsic status of the figures (gods, heroes or semi-gods, and humans), but also inversely related to the total number of figures, which suggests a quantity discount.

For the most celebrated Greek painter, Apelles, active around 350–310 BC, we know many anecdotes, occasionally including price matters. Alexander the Great paid 20 talents for his portrait as “Alexander Keraunophoros” or wielding a thunderbolt, a distinctive attribute of Zeus (Pliny, 35, 92). The work was destined for the Temple of Artemis in the newly conquered town of Ephesus. Since the reign of Alexander the Great lasted from 336 BC to 323 BC and the Temple of Artemis was probably completed at a late moment, we can date the work after the commissions of Mnason and during the Persian campaign of Alexander, probably around 325 BC, when the Porus dekadrachms featuring Alexander with a thunderbolt were struck. Another anecdote by Pliny reinforces the message that Apelles could obtain higher prices later on, temptatively in the last two decades of the IV century BC. When Apelles visited Protogenes in Rhodes and asked about the price of his works, Protogenes mentioned a small amount. Then, Apelles offered 50 talents for a painting and spread the word that he was going to resell it as his own painting. This signaled to the Rhodians the high esteem he had for the rival, and Apelles ended up selling the paintings at prices higher than what he paid (Pliny, 35, 88). We can guess that the prices of paintings by Protogenes, a sort of experimental artist in the sense of Galenson (2024), must have been increasing in the last phase of his career. Most important for our purposes, what we can reasonably infer from this anecdote is that at that time, arguably around 315 BC, Apelles was able to sell a painting for 50 talents, though we cannot draw any conclusion on the size and composition corresponding to such a high price. This shows not only the business acumen of a leading artist such as Apelles, engaged in an early case of successful art investment, but also how quickly price increases could spread around Greece.²³ At the end of his life, Apelles moved to Kos, where, between 306 and 301 BC, he painted one of his most famous paintings, an “Aphrodite Anadyomene” (Venus rising from the sea), left unfinished for the temple of Asklepios. We will find this painting again, traded in the secondary art market.

²³ Further evidence on the link between art prices and market conditions is provided by Pliny (35, 145), who notices the curious fact that the paintings left unfinished at the death of the artists had a higher value. This was the first recognition of a death effect on art prices, which is nowadays well documented.

According to Plutarch (*Moralia*, 1093), King Ptolemy I of Egypt offered 60 talents to Nicias of Athens for a “Nekyomanteia,” or consultation of the souls, drawn from the *Odyssey* of Homer. Nicias was one of the most recognized history painters of the time, and by then he must have been old, rich, and famous since he refused the sale and donated the painting to his own town. In Book XI of the epic poem, Odysseus spoke with Elpenor, Tiresias, and Anticleia on his underworld journey and met dozens of souls, which suggests that this was a wide composition with a large number of figures, comparable to (and possibly inspired by) the one of Polygnotus on the same subject. Since the reign of Ptolemy I lasted from 305/4 BC to 282 BC, we can tentatively date the painting to 290 BC. In any case, this is the last and also the highest documented price evaluation that we find in the primary market for ancient Greek paintings.

Further information is from the secondary art market. In the II century BC, King Attalus of Pergamon bought a painting by Aristeides of Thebes for 100 talents (Pliny, 35, 100). This was probably Attalos II, whose reign lasted from 159 to 138 BC, exactly the time in which Pliny argued that art was revived after a period of stagnation. He was a renowned patron of the arts (and completed the Great Altar of Pergamon) as well as an avid collector of works by Aristeides, since he was again interested in a painting by him at an auction in 146 BC, which gives us the first record of an auction sale of a precise painting. According to Pliny, the auction took place after the sack of Corinth by the Roman army of Lucius Mummius, and the painting was a “Dionysus and Ariadne” by Aristeides confiscated by the Corinthians after the battle. However, the sale to Attalos for the same amount of 100 talents surprised Mummius so much that he wanted the painting back and brought it to the temple of Ceres on the Aventine in Rome (Pliny, 35, 24). Since this happened at the end of the reign of Attalos, we can conjecture that he already owned the (probably) distinct painting by Aristeides purchased at the same price, and that size and composition were not too different, justifying a similar expenditure. Given the wide and long career of this painter, possibly another experimental artist, it seems plausible that these masterpieces traded in the secondary market were from the late activity of Aristeides, which took place between 320 and 310 BC.

We are also aware of transactions of lower value in the later secondary art market of Rome. In the first half of the I century BC, the Roman orator Hortensius purchased a panel of “The Argonauts” by Kydias for 6 talents, and we are told that he built a small shrine for it in his villa of Tusculum (Pliny, 35, 130). The destination and the title suggest that the painting was large and contained more than a couple of figures, but the

subject was probably the pretext for a landscape or marine painting, and therefore the figures may not have played a dominant role in the composition. For a cheaper acquisition, we can look at copies of masterpieces. Pliny mentions a I century BC copy by Dyonysios of Athens of a famous painting by Pausias, which was therefore originally executed around 350 BC. The copy was purchased for 2 talents by the Roman statesman Lucius Lucullus (118–56 BC) at the Dionysia festival in Athens, possibly in 88/87 BC, when he was documented there. It was a portrait of a young girl named Glycera, a lover of Pausias, selling garlands of flowers (Pliny, 35, 125). This is the oldest painting with a content of portrait and still life for which we have records of a commercial transaction, and its subject would have been perfect in a “lucullan” banqueting room. Taking into account the lower position of still life in the hierarchy of paintings and the fact that this one was just a copy, the price was remarkable. It is probably not a coincidence that Pliny, with his encyclopedic attitude, managed to provide price records for masterpieces in all the main genres. And it is not unreasonable to assume that his small sample of price records was representative of the larger sample of masterpieces he must have read about (in Greek sources) while preparing the chapters of the *Naturalis Historia* on art.

Julius Caesar was also a collector. Though his military campaigns in Gaul and his forays into Britain and Germany could not find artworks comparable to those of the Eastern world, according to Suetonius (*Life of Caesar*, 47), “he attacked Britain in the hope of finding pearls... and he was always avid collector of gems, engravings, statues, and paintings of ancient workmanship.” After his victory over Pompeus at Pharsalus in 48 BC, Caesar personally purchased two paintings by Timomachus of Byzantium, an “Ajax” and a “Medea,” for 80 talents to be placed in the Temple of Venus Genetrix (Pliny, 35, 136). The same painter may have been the author of an “Ajax” and an “Aphrodite” purchased in Cyzicus, near Byzantium, for 50 talents by Marcus Agrippa (63–12 BC), a statesman promoter of the necessity of exhibiting art in public collections rather than in private villas (Pliny, 35, 26). Pliny reports that Timomachus left “Ajax” and “Medea” unfinished when he died, which may have been right before the purchase by Caesar. However, there are good reasons to doubt that Timomachus was a painter of the I century (see, for instance, Gutzwiller 2004). It seems unlikely that, in a period in which many artists were migrating to Rome (including Iaia of Cyzicus), a major artist was still active in the periphery of the Roman world. Most of all, already in 70 BC, Cicero had pointed out the existence in Cyzicus of two masterpieces representing “Ajax” and “Medea,” wondering how much they could cost

(*In Verrem*, IV, 60, 135). It seems likely that these masterpieces were those purchased by Caesar for such a prestigious destination in Rome, which would suggest that the artist was not a contemporary painter, but a famous master of earlier times. This has supported the hypothesis that Timomachus was active in the early III century BC or even in the late IV century BC. We will endorse this convincing hypothesis and tentatively assign these works to 300 BC.

Octavian Augustus was not an art collector and did not decorate his own house with statues or paintings, but was nevertheless interested in bringing classic masterpieces to Rome for public display. The contemporary historian Strabo claims (*Gheographikà*, 14, 657) that Augustus purchased the “Aphrodite Anadyomene” of Apelles from the temple of Asklepios in the city of Kos, remitting 100 talents of due taxes. The same interest may have been shared by the cultural administrator of Augustus, the wealthy Gaius Clinius Maecenas, who became famous as a patron of the arts and a supporter of poets such as Virgil and Horace. However, there is no evidence that such “maecenatism” extended to contemporary painters and sculptors, another sign that at the time the local artists were mainly artisans without a relevant role in the cultural life of Rome. The emperor Tiberius was another avid collector who owned works at least by Zeuxis, Parrhasius, Apelles, Protogenes, and Nikias and had a special interest in lascivious subjects. He destined to his private rooms an “Atlanta and Meleager” by Parrhasius that evaluated 40 talents,²⁴ and the famous statue of the “Apoxymenos” by Lysippos.

Under the heroic assumption that we can turn into data the conjectures made earlier, we can put together 21 price records. In Figure 1, we display these prices corrected for the purchasing power of a talent in 450 BC in Athens based on the evidence of wage inflation in Loomis (1998). The estimated date of execution covers almost two centuries, and we distinguish prices from primary sales in solid circles and from secondary sales in empty circles. The amount of data is of course limited, but an increasing trend in real prices emerges overall and also, focusing only on sales in the primary market, with the top prices for works executed at the end of the IV century. A more formal empirical analysis confirms such a positive trend in hedonic regressions, controlling for additional information available on these artworks. In particular, we have used different controls for the quality of the artists. In one case, we used dummies for

²⁴ According to Suetonius (*Life of Tiberius*, 44), when Tiberius obtained the painting depicting Atalanta pleasuring Meleager on condition that if the theme displeased him, he was to have a million sesterces instead, he chose to keep the painting and actually hung it in his bedroom. The painting could be tentatively dated to around 390 BC.

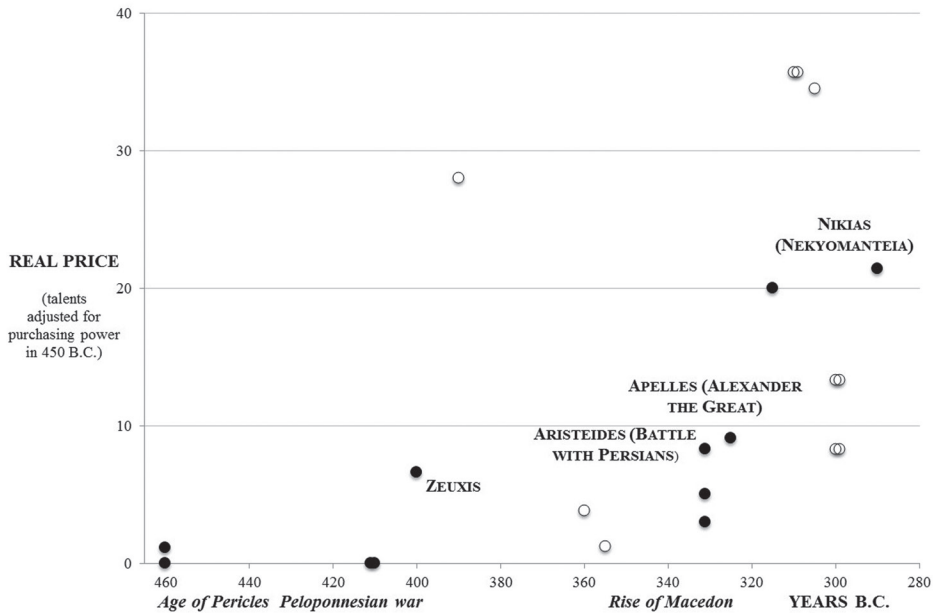


FIGURE 1
REAL PRICES OF PAINTINGS IN CLASSICAL GREECE, V–III CENTURY BC

Notes: The prices of the primary market are in solid circles and the prices from the secondary market are in empty circles. The year refers to the estimated date of execution.
Sources: Nominal prices from literary sources. Adjustment for purchasing power from Loomis (1998).

artists with multiple observations, that are Zeuxis, Apelles, and Aristeides. While the first is associated with a negative coefficient and the last two with positive coefficients, the inclusion of their dummies does not affect the evidence of a positive time trend. In other specifications, we have employed a proxy of artistic quality as perceived in ancient times based on the length of the biography of each painter in the *Naturalis Historia* of Pliny. Such a Pliny index contributes to explaining price variability, providing a positive and significant coefficient, but does not eliminate the significance of the positive time trend.²⁵ The estimated number of figures in the paintings has always a positive impact on prices, but this is neither economically nor statistically significant. The dummy for sales in a secondary market has a positive and sometimes significant coefficient. The unconditional time trend corresponds to an increase of 1.6 percent per year in the real price of masterpieces, and remains above 1 percent per year in full specifications and in robustness checks limited to sales

²⁵ The index is led by Apelles (189), Parrhasius (66), Zeuxis (50), Pausias (40), Aristeides (32), Nikias (29), and Polygnotus (19) and is positively correlated with prices.

in the primary market or sales at positive prices. Overall, the evidence supports an increase in the price of masterpieces between the beginning of the V and the end of the IV centuries BC, which is when the literary sources document a sequence of major artistic innovations.

EVIDENCE ON THE PRICE OF STATUES IN THE ROMAN EMPIRE

The main piece of evidence on art prices during the Roman Empire comes from inscriptions at the base of statues spread around all the provinces, sometimes recording prices of the commissions to honor the munificence of the donor. Since towns that have been repeatedly built during the following centuries are less likely to conserve such remnants, a large part of the epigraphic evidence derives from peripheral towns and archeological sites that have not been excavated until recent times, whose distribution covers most of the “Romanized” provinces of Europe and Africa, where many colonies founded or populated by Roman citizens were being decorated with temples, forums, baths, and villas that required new statues. The wide geographical distribution of the evidence is quite important because our interest is in comparing prices across different and remote locations of the Empire rather than identifying prices of works ordered in Rome by emperors under unique monopsonistic conditions. The statues were commissioned by local communities and private donors for public display, and they were erected on bases engraved with information on the commission, its subject, and its purpose. They included statues of gods, heroes, and portraits of the emperor (often replicas of models sent from Rome), portraits of women of the imperial family, and portraits of the same donors.

The first collection of records of prices of statues was put together by Friedlander (1913), but the most comprehensive one is due to Duncan-Jones (1982), who focused most of his attention on the African provinces, which covered a large area between modern Morocco and Libya. At the time, these provinces were Mauretania, Numidia, and Africa Proconsularis (Byzacena, Tripolitania, and Zeugitana), including Numidia Procunsularis. In these provinces, the median price of statues was HS 5,000, around six times the average annual labor compensation in the early Empire (Temin, 2013). But the variability was also high: the major town of Leptis Magna left a statue priced at HS 460 and a commission of 16 statues for a total of a million sesterces. As an example, focusing on dated standalone marble statues of Septimius Severus erected in Numidia at the beginning of his reign between 193 and 198 AD, we find prices of HS 2,400 and 3,400 in a rural center of modern Algeria and

HS 4,000, 4,300, and 10,000 in the nearby town of Diana, suggesting a certain variability.

Italy provides few price records analyzed by Duncan-Jones (1982, p. 126), who admits that his sample is too small and uneven to draw solid conclusions on price comparisons, but suggests that “it is reasonable to suppose that the norms in Italy would not have been very different from those in Africa, where the heaviest concentration of statue prices lies in the range from HS 4,000 to HS 7,000.” Also in Italy, price variability was high, in a range including a statue from Volsini in Etruria priced HS 500 before 200 AD and a silver chariot of the II century priced HS 100,000 in Formiae in Latium. We have added to the dataset a few more records from Italian regions whose inscriptions were published during the last four decades. For instance, this was the case of Barium in Apulia with a statue of HS 10,000 from the middle of the II century (AE 2008, 416), Misenum in Latium with HS 20,000 in 161–211 AD (AE 1995, 311), Potentia in Lucania with HS 10,000 during the I century (AE 1995, 370), and Interamnia Praetuttiorum in Picenum with HS 4,000 during the II century (AE 2013, 194). The final dataset includes statues from the regions of Latium and Campania, Lucania, Venetia, Umbria, Apulia, Etruria, Transpadania, Aemilia, Picenum, and Samnium.

Gallia and other northern European provinces provide an additional group of price records. Drinkwater (1979, 2014) has mentioned a couple of statues from Aventicum in Germania Superior, to which we should add a statue of Mars priced at HS 48,000 at the end of the II century in Mutigney (in modern Swiss territory) for a testamentary outlay (AE 2014, 896). The nearby province of Gallia Narbonensis left a bronze of HS 6,000 in Arles (AE 2002, 921) and silver statues from Nimes (AE 1982, 682, and CIL 12, 3058), Narbonne (CIL 12, 4445), and Vienne (CIL 12, 5864). From other northern provinces, we also have a couple of price records in Pannonia Inferior (in modern Hungary), respectively HS 50,000 for a statue from Aquincum (AE 1990, 810) and HS 40,000 for a statue from nearby Vetus Salina (AE 2013, 1201). We should also add the unique case of a Roman artwork that arrived to us with the name of the artist and price, a bronze statuette from Britannia whose base has inscribed a dedication to Mars from the Colasuni brothers: they paid HS 112 to the coppersmith Celatus, of which HS 12 was for the bronze material and the rest for the execution. This corresponds to a cost of artistic manufacture representing about 90 percent of the total price, probably in line with common works in marble, but higher compared to larger metal statues (for which the cost of the material could be more relevant).

Spain was deeply “Romanized,” and its local communities ordered many statues for which we have price records. Curchin (1983, 2014) has collected a list of prices of statues for the Spanish provinces that we use in our dataset, with a few additions. In particular, we add a statue valued at HS 7,505 according to an inscription from Guadix in Hispania Citerior (CIL 2, 3390) and a price of HS 4,800, probably for two statues commissioned in Hispania Baetica (CIL 2, 1359). We have aggregated observations from these provinces under the group from Hispania.

Asia Minor provides more interesting evidence added to our dataset. Barresi (2003) has analyzed its commissions, with a particular focus on the province of Asia. He has pointed out seven statues representing the different tribes of the town of Philadelphia, which were paid a total of HS 28,000 at some point after 212 AD, and a statue representing its own donor, Aeliua Aelianos, recorded in the town of Thyatira and paid HS 4,000 between 222 and 235 AD. Moreover, the major town of Ephesus has provided epigraphic evidence of a few groups of silver statuettes dated in 104 AD. For six of them, each one representing Diana Artemis of Ephesus, together with two other figures, we have the prices, ranging between HS 6,533 (IK-11-01, 34), HS 17,000 (CIL 3, 14195-4, and HS 33,000 (CIL 3, 14195-5,6,7,8). More limited is the information from Greece. However, we can exploit a literary source from the early II century AD: Dio Chrysostom (*Discourses*, 31, 59) mentioned that at the time one could erect statues at the cost of HS 2,000 or HS 4,000 in Rhodos, which also belonged to the province of Asia. Finally, a small marble statue was priced at HS 140 during the II century AD in Philippi within the province of Macedonia (CIL 3, 633). We group these observations from Greece and Asia.

The final dataset includes 202 price records (Etro 2023). The basic information contains the price and the place of the commission. Between statues from Italy (23 observations), we have most of the records from Latium and Campania, Lucania, Venetia, Umbria, Apulia, and Etruria. Outside of Italy, the province featuring most of the prices of single statues is Numidia (73 observations), followed by Africa Proconsularis (66 observations), Asia, Hispania Baetica, Gallia, Mauretania Caesariensis, and Germania Superior. For about two-thirds of the observations, we can recover from the inscriptions the date of commission of the statue or, more often, the approximate period. On this basis, we have allocated statues between those from the *I century* (including the Julio-Claudian and Flavian dynasties), the period of the emperors *Trajan and Hadrian* (98–138 AD), the *Antonini* emperors (138–192 AD), including Antoninus Pius, Lucius Verus, Marcus Aurelius, and Commodus, the dynasty of the *Severans* (193–235 AD), including Septimius Severus, Caracalla, Geta, Elagabalus and Severus

TABLE 1
DESCRIPTIVE STATISTICS ON ROMAN STATUES, I–III CENTURY AD

Descriptive Statistics					
	Mean	Median	St. Dev.	Min.	Max.
Price (HS)	16,491	5,000	72,172	112	1,000,000
Real Price (HS of 0 AD)*	8,390	3,462	11,626	37	69,930
N. of statues	1.2	1	1.3	1	16
Small	0.11	0	0.32	0	1
Large	0.19	0	0.39	0	1
Silver	0.08	0	0.28	0	1
Bronze	0.04	0	0.21	0	1
Testament outlay	0.16	0	0.37	0	1
Year (AD)	166	175	49.6	50	276
Prices (HS) for:	Mean	Median	St. Dev.	Min	Max
Numidia	8,010	5,000	8,368	1,000	50,000
Africa Procunsularis	24,451	5,000	122,533	460	1,000,000
Mauretania	6,000	6,000	1,224	5,000	8,000
Hispania	3,987	4,000	2,577	248	8,000
North Europe	37,346	6,000	58,033	112	200,000
Italy	18,709	10,000	24,067	400	1,000,000
Greece and Asia	17,227	17,000	14,625	140	33,333
Portrait	12,073	4,400	17,226	140	60,000
Emperor	9,021	7,000	8,682	600	38,000

*Statistics on real prices and year are for commissions with estimated period of execution (123 observations).

Sources: Our elaboration on nominal prices from epigraphic sources (202 observations). Adjustment for purchasing power from Wassink (1991).

Alexander, and the *Mid III century*. When the estimated period of commission overlaps between two of these groups, the statue is attributed to both of them. For quantitative purposes, we have also assigned the exact year of execution when this was available or an estimate when the range was well defined in a limited period (123 observations).

Prices are all reported in sesterces (possibly converted from denari), and they all belong to the period preceding the beginning of inflationary pressures in the last three decades of the third century. Table 1 reports descriptive statistics for the dataset. In almost all cases, we know the subject of the statue. Portraits of Roman emperors are common in the dataset (35 observations), and Hadrian is the most frequent one, which is consistent with the fact that there are more surviving portraits of him than of any other emperor after Augustus: statues of Hadrian are recorded in Africa Procunsularis at Hippo Regius in 117/138 AD for a price of HS 17,000, at Vina in 138/161 AD for HS 2,400, and at Sturnuca in 146 AD together with a statue of Lucius Verus for a total price of HS 5,525. Other frequent emperors in the dataset are Antoninus Pius, Marcus Aurelius, Commodus, Septimius Severus, and Caracalla. For instance, Antoninus Pius appears in

Samnium with a statue of HS 4,000 dated 140 AD, in Mauretania with one of HS 6,000 dated 156 AD, in Africa Proconsularis with two statues priced at HS 600 and HS 800 around the same period, and elsewhere jointly with other emperors.²⁶ There are also female imperial portraits such as those of Julia Domna found in Ammaedara and Medeli in Africa Proconsularis, priced at HS 10,000 and HS 3,000, respectively, at the beginning of the third century. Another frequent subject is represented by mythological gods and heroes with 55 statues, often about Jupiter (present, for instance, with two statues dated before 200 AD and priced at HS 800 in Venetia and HS 10,000 in Transpadania, one of HS 6,000 from the II century in Baetica, and two statues erected in Numidia in 182 and 212 AD for HS 5,000 and HS 4,000, respectively), Heracles (with an early statue from Umbria priced HS 30,000 and others from Mantua as well as Numidia), and Aesculapius. Other frequent gods are Mercury, Apollo, Iuno, Minerva, Mars, Pluto, and Neptune. We also have portraits of donors (23 observations) and many idealized figures, such as the youthful male *Genius Populi Romani* or the female *Victoria Augusta* and *Fortuna Redux*.

Our records are confined to cases where we know the exact number of statues commissioned for a given price: most of the records refer to one statue, but there are many instances of a couple of statues and cases of multiple ones. We often have information about the material of the statues, and a conjecture by Duncan-Jones (1982) is that when the material is not specified in the inscription, the statue is likely to be in marble. While this conjecture cannot be verified, it was probably correct in a majority of cases; therefore, we consider marble and unknown material as our baseline category and build dummies for statues in bronze (9 observations) and silver (17 observations). We occasionally know when the price also covered an *aedicola* (we excluded more complex constructions as those combining arches and small temples with a statue) or the same base, and when it was referred to an equestrian statue (as in two portraits of Septimius Severus erected in 196/197 AD for HS 12,000 or the one of Marcus Aurelius erected in 146 AD for HS 8,000, all of them in Zeugitania), and we classify these as cases of large statues (38 observations). Instead, statuettes and busts are classified as small statues (23 observations). In some cases, we know the purpose of the commission, as in the 32 cases of testament outlays (typically associated with private commissions after the death of the donor or a relative), and occasionally we also know the name of the patron who paid for the commission. Since we know the exact provenance of the statues, we have identified those commissioned in large towns (48 observations) and coastal towns

²⁶ See Højte (2005) for a comprehensive study of the bases of statues of the Roman emperors.

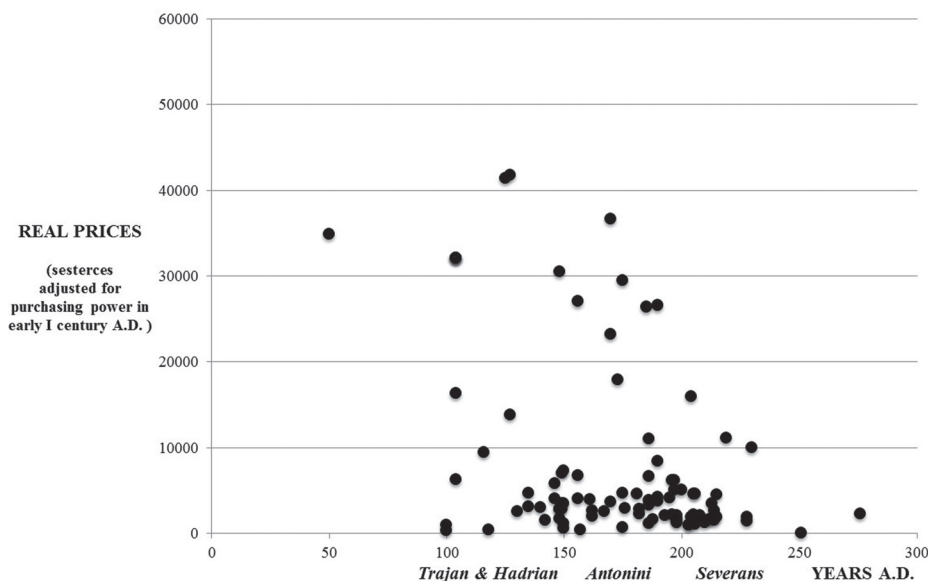


FIGURE 2
 PRICES OF STATUES IN THE ROMAN EMPIRE, I-III CENTURY AD

Notes: The prices are in sesterces adjusted for changes in the cost of living relative to the Augustean age. The years refer to the date of dedication of the commissioned statues. The date is estimated when the period of execution is uncertain (over less than a century).

Sources: Nominal prices from epigraphic sources. Adjustment for cost of living from Wassink (1991).

with direct access to the Mediterranean Sea (26 observations): in the former case, one may expect higher prices due to higher demand or richer patrons, and in the latter, one may expect lower prices due to lower costs of shipping statues (or better access to information due to connection with the rest of the world) compared to inland and remote towns.

Figure 2 reports prices in sesterces corrected for the cost of living in the Augustean age (early I century) using the index of Wassink (1991) and is limited to commissions with precise dates of execution. Overall, the commissions cover more than two centuries and emphasize a great variability of prices around a median price of HS 5,000 in nominal terms and HS 3,462 with adjustment to the price level in the Augustean age. The statistics on the nominal prices by province and subject confirm substantial variability, with prices in northern Europe, Africa Proconsularis, and Italy that are above those of Spain and other African provinces. However, a large part of this variability can be explained by the characteristics of the underlying commissions.

The regressions of Tables 2 and 3 on nominal and real log prices are divided between a version with basic characteristics of the statues in

TABLE 2
REGRESSIONS ON ROMAN STATUES (NOMINAL PRICES),
I–III CENTURY AD

	(1) Baseline	(2) Time	(3) Location	(4) Genre	(5) Full
<i>Characteristics</i>					
N.statues	0.481*** (0.144)	0.475*** (0.146)	0.602*** (0.155)	0.592*** (0.159)	0.520*** (0.162)
N. statues squared	–0.008 (0.010)	–0.007 (0.010)	–0.015 (0.010)	–0.015 (0.011)	–0.013 (0.011)
Small	–1.688*** (0.233)	–1.654*** (0.238)	–1.534*** (0.244)	–1.518*** (0.252)	–1.560*** (0.318)
Large	0.858*** (0.169)	0.858*** (0.175)	0.871*** (0.178)	0.877*** (0.180)	0.852*** (0.181)
Silver	1.654*** (0.272)	1.675*** (0.287)	1.658*** (0.296)	1.688*** (0.299)	1.589*** (0.318)
Bronze	–0.919*** (0.163)	–0.903*** (0.319)	–1.008*** (0.327)	–1.053*** (0.336)	–0.943*** (0.335)
Testamentary outlay					0.546*** (0.201)
<i>Date</i>					
Date unknown		omitted	omitted	omitted	omitted
I century AD		–0.116 (0.308)	–0.274 (0.324)	–0.311 (0.328)	–0.223 (0.328)
Trajan & Hadrian		–0.037 (0.206)	0.096 (0.224)	0.084 (0.227)	0.054 (0.237)
Antonini		0.159 (0.146)	0.107 (0.147)	0.145 (0.155)	0.080 (0.160)
Severans		0.091 (0.152)	0.096 (0.152)	0.131 (0.157)	0.098 (0.157)
Mid III century AD		0.024 (0.283)	0.089 (0.282)	–0.013 (0.293)	0.100 (0.295)
<i>Location</i>					
Numidia			omitted	omitted	omitted
Africa Procunsularis			0.041 (0.156)	0.091 (0.161)	0.122 (0.183)
Mauretania			0.046 (0.156)	0.092 (0.419)	0.129 (0.418)
Hispania			–0.132 (0.304)	–0.152 (0.312)	–0.141 (0.320)
North Europe			0.222 (0.318)	0.257 (0.327)	0.216 (0.328)
Italy			0.368* (0.231)	0.400* (0.241)	0.414 (0.260)

TABLE 2 (CONTINUED)
REGRESSIONS ON ROMAN STATUES (NOMINAL PRICES),
I–III CENTURY AD

	(1) Baseline	(2) Time	(3) Location	(4) Genre	(5) Full
Greece and Asia			-0.739** (0.378)	-0.671* (0.389)	-0.357 (0.420)
Numidia Procunsularis					0.129 (0.273)
Coast city					-0.134 (0.256)
Large city					0.290 (0.256)
<i>Subject</i>					
Subject unknown				omitted	omitted
Portrait				-0.283 (0.233)	-0.281 (0.232)
Emperor				-0.225 (0.207)	-0.188 (0.206)
Victoria and Fortuna				-0.049 (0.224)	-0.131 (0.224)
Mythological subject				-0.176 (0.177)	-0.093 (0.186)
Jupiter					-0.432 (0.384)
Constant	8.055*** (0.163)	7.990*** (0.179)	7.817*** (0.203)	7.914*** (0.227)	7.871*** (0.226)
Observations	202	202	202	202	202
R-squared	0.453	0.459	0.486	0.492	0.522

Notes: Robust standard errors are in the parentheses. Significance: *** p<0.01, ** p<0.05, * p<0.1.
Sources: Nominal prices from epigraphic sources.

Column (1), a version controlling for temporal differences in Column (2), one augmented also with destination dummies in Column (3), another also including the subjects of the statues in Column (4), and finally the full specifications. Table 2 shows that the nominal prices covary in an expected way with the number of statues (the relation is increasing and possibly concave), and with their size, as well as with the use of silver, which is priced above the omitted material (mostly marble), and above bronze. The price appears higher than average in case of testamentary outlays. The subject of the statues does not appear to significantly affect their prices, as one should expect in a competitive market where artists are employed on different subjects. Moreover, nominal prices do not change

TABLE 3
REGRESSIONS ON ROMAN STATUES (REAL PRICES),
I–III CENTURY AD

	(1) Baseline	(2) Time	(3) Location	(4) Genre	(5) Full with Trend	(6) Full with Periods
<i>Characteristics</i>						
N. statues	1.197*** (0.371)	1.095*** (0.371)	1.334*** (0.374)	1.410*** (0.386)	1.175*** (0.418)	1.189*** (0.423)
N. statues squared	-0.123** (0.057)	-0.105* (0.058)	-0.124** (0.058)	-0.141** (0.060)	-0.141* (0.063)	-0.106 (0.064)
Small	-1.599*** (0.323)	-1.692*** (0.323)	-1.654*** (0.341)	-1.723*** (0.352)	-1.743*** (0.349)	-1.690*** (0.351)
Large	0.733*** (0.231)	0.802*** (0.232)	0.636** (0.252)	0.584** (0.255)	0.698*** (0.252)	0.826*** (0.262)
Silver	1.748*** (0.403)	1.649*** (0.402)	2.017*** (0.415)	2.195*** (0.433)	2.189*** (0.318)	2.180*** (0.504)
Bronze	-1.032** (0.423)	-0.958** (0.420)	-0.983** (0.417)	-1.042** (0.423)	-0.973** (0.412)	-0.879** (0.417)
Testamentary outlay					0.817*** (0.251)	0.722*** (0.266)
<i>Date</i>						
Year		-0.004* (0.002)	-0.002 (0.002)	-0.001 (0.002)	-0.001 (0.002)	
1 century AD						0.452 (0.468)
Trajan and Hadrian						0.153 (0.307)
Antonini						0.403 (0.251)
Severans						0.140 (0.275)
Mid III century AD						-0.342 (0.335)
<i>Location</i>						
Numidia			omitted	omitted	omitted	omitted
Africa Proconsularis			-0.213 (0.212)	-0.111 (0.224)	-0.089 (0.251)	-0.156 (0.262)
Mauretania			0.0003 (0.561)	0.054 (0.572)	0.206 (0.565)	0.163 (0.567)
Hispania			-0.058 (0.415)	0.090 (0.436)	-0.124 (0.454)	-0.446 (0.511)
North Europe			0.847* (0.5038)	1.122** (0.532)	0.539 (0.548)	0.401 (0.559)
Italy			0.434 (0.329)	0.680* (0.367)	0.732* (0.404)	0.621 (0.382)

TABLE 3 (CONTINUED)
REGRESSIONS ON ROMAN STATUES (REAL PRICES),
I–III CENTURY AD

	(1) Baseline	(2) Time	(3) Location	(4) Genre	(5) Full with Trend	(6) Full with Periods
Greece and Asia			-0.774* (0.434)	-0.572 (0.455)	-0.295 (0.503)	-0.400 (0.525)
Numidia Proconsularis					0.211 (0.413)	0.338 (0.440)
Coast city					-0.323 (0.328)	-0.263 (0.334)
Large city					0.166 (0.280)	0.089 (0.288)
<i>Subject</i>						
Subject unknown				omitted	omitted	omitted
Portrait				-0.283 (0.233)	-0.514 (0.322)	-0.555* (0.334)
Emperor				-0.225 (0.207)	-0.218 (0.239)	-0.263 (0.262)
Victoria and Fortuna				-0.049 (0.224)	-0.085 (0.306)	-0.038 (0.316)
Mythological subject				-0.176 (0.177)	-0.041 (0.294)	-0.071 (0.296)
Jupiter					-0.798 (0.510)	-0.823 (0.531)
Constant	6.888*** (0.347)	7.586*** (0.503)	7.146*** (0.583)	7.029*** (0.601)	7.064*** (0.589)	6.600*** (0.533)
Observations	123	123	123	123	123	123
R-squared	0.450	0.467	0.522	0.537	0.589	0.606

Notes: Robust standard errors are in the parentheses. Significance: *** p<0.01, ** p<0.05, * p<0.1. *Sources:* Nominal prices from epigraphic sources. Adjustment for purchasing power from Wassink (1991).

much over time, though there is a slight increase in the latest periods, which, as we will see, is in part due to the underlying inflation. Consistent with what one may expect, coastal cities are associated with lower prices and large cities in each province with higher prices; however, the coefficients of both these control variables are not statistically different from zero. Without controls, statues for Italian locations exhibit higher than average prices, and those for Greece and Asia Minor exhibit lower than average prices. However, in the full specification, none of the destination dummies has a significant coefficient, which is consistent with our main prediction that market integration contributed to equalizing art prices across the provinces of the Roman Empire.

Finally, in Table 3, we confine our attention to the 123 commissions for which we have a precise date or a reliable estimate of the period in which they were commissioned and executed, and we adjust prices for the cost of living using the price index of Wassink (1991); the observations are those displayed in Figure 2. The results show a negative but minimal trend in real prices, which is not statistically significant. The increasing and concave relationship between prices and the number of commissioned statues is now mostly significant, and the other main patterns of the earlier set of regressions are confirmed. In particular, the available evidence on the real prices of statues from the Roman Empire confirms that these prices were largely equalized across different provinces, supporting the hypothesis that increasing trade over a large integrated market was equalizing profit opportunities across destinations.

CONCLUSION

We have studied art trade in the Greco-Roman world, exploiting literary evidence preserved by ancient writers and epigraphic evidence that survived after two millennia. Our purpose was to explore the economic determinants of different paths followed by Greek and Roman art markets. We have argued that increasing competition between patrons from rival city-states in classical Greece contributed to generating quality-enhancing innovations and rising prices for artists' works, together with the growing prestige of the same artists within society. Instead, the later Roman Empire developed a larger integrated market that tended to foster mass production and cost-saving innovations, and therefore a general leveling out of prices paid for art over time and across space, with the artists gradually sinking back into the anonymous role of craftsmen. The available evidence on art prices over time and space appears to be consistent with these different paths.

There are some avenues for future research in economic history and cultural economics. One may further exploit the data collected by modern quantitative approaches on the ancient world and verify the importance of other socio-economic factors in affecting art production. Moreover, one may compare the patterns emphasized in the ancient world with those of other historical periods and enrich the analysis of the determinants of artistic creativity. Similar explorations have been recently extended to other fields of art, literature, and music, focusing on the history of art markets. In general, we believe that further analysis could shed a new light on the evolution of art history and human creativity.

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