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The monetary systems of the Han and Roman empires

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Abstract: The Chinese tradition of supplementing large quantities of bronze cash with unminted gold and silver represents a rare exception to the western model of precious-metal coinage. This paper provides a detailed discussion of monetary development in ancient China followed by a brief survey of conditions in the Roman empire. The divergent development of the monetary systems of the Han and Roman empires is analyzed with reference to key variables such as the metal supply, military incentives, and cultural preferences. This paper also explores the “metallistic” and “chartalistic” elements of the Han and Roman currency systems and estimates the degree of monetization of both economies.

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1. Introduction

Beginning in the third century BCE, the imperial unification of both East Asia and the Mediterranean gave rise to increasingly standardized currency systems that sought to establish stable means of payment. In both cases, the eventual monopolization of minting tied the success of these currencies to the fortunes of the state. Yet despite these basic similarities, substantial differences prevailed. While silver and later gold dominated the monetary economy of the Roman empire, the victorious Chinese regimes operated a system of bronze coinages supplemented by uncoined precious-metal bullion. This raises a series of questions. How did these differences arise, and why did they persist well beyond antiquity? How did the use of different metals affect the relationship between the nominal and intrinsic value of monetary objects? Did the minting of precious metals in the West and China's reliance on copper determine overall levels of monetization? To the best of my knowledge, none of these issues has ever been addressed from a comparative perspective. The failure to do so has made it harder to appreciate the specific properties of each of these two monetary systems. Explicit comparison brings the constituent elements of each tradition into sharper relief: by defamiliarizing the familiar, it invites us to question established interpretations and reconsider the nature of putative causal relationships.

Because this survey is the first of its kind, much of it is taken up by a parallel exposition of monetary histories that provides a basis for the comparative analysis of specific features. The format of this exposition is in large part determined by the historiography of the subject. It is not an exaggeration to say that the existing body of research scholarship on Roman coins, money, and the monetary economy greatly exceeds corresponding scholarship on early Chinese money in terms of both volume and sophistication. As a consequence, while the physical characteristics of Roman coins and their distribution have already been studied in very considerable detail and much attention has been paid to their relevance to broader questions of economic history, our knowledge of ancient Chinese money and its uses remains much more limited and fragile and many important questions have barely been addressed at all. Taking account of this massive imbalance, I discuss the Chinese evidence at some length (sections 2-5) but limit myself to a skeletal outline of conditions in the Roman world (section 6). Each survey is followed by a brief summary of what I consider to be the principal trends and patterns (sections 5 and 6.2).

These parallel surveys prepare the ground for more systematic comparative analysis. In section 7, I explore the causes of the dominant monetary position of different metals in eastern and western Eurasia in antiquity and argue for a combination of geological and culturally contingent factors. In section 8, I challenge the conventional "nominalistic" understanding of early Chinese money by documenting the crucial significance its of intrinsic (metal) value. I argue that the emergence of monopolistic super-states in both eastern and western Eurasia favored the creation of hybrid currency systems in which the lack of competition relaxed "metallistic" constraints without removing them altogether, and that coin users in both systems retained a substantial degree of sensitivity to the intrinsic value of their currencies. The final section seeks to quantify the metal money stocks of the Han and Roman empires at the peak of their powers. My findings lead me to the conclusion that in real terms, the Roman imperial economy was probably considerably more monetized than that of the Han state.

It is important to clarify the scope of this study. "Money" is a notoriously elusive concept. In historical societies, "all-purpose" money that simultaneously served as a medium of exchange, a store of wealth, and a unit of account represented merely a subset of all monetary objects and instruments: while coinage often – though not always – met all three criteria, weighed bullion, tokens, "near-money" (such as bills of exchange), foodstuffs, textiles, real estate, livestock, slaves, or cowrie shells were all similarly capable of performing one or more of these functions. Under the right circumstances, they could all "count" as "money." In the following sections, I concentrate primarily on coined or otherwise normed metal money. This focus owes more to necessity than to choice: the nature of the evidence forestalls a meaningful comparative

assessment of credit money in the Han and Roman economies, and the actual scale of monetary use of normed textile fabrics in the former is impossible to gauge. Moreover, constraints of space compel me to forego comparative consideration of monetary thought and the invocation of money in literary discourse, a fascinating topic that would readily support a book-length study.¹ Finally, it is worth noting that as far as the physical nature of coined money is concerned, conditions in Ptolemaic and Roman Egypt – where bronze and much-debased billon issues played a central role – bore a much closer resemblance to early Chinese practices than those in most other parts of the Roman empire.² These similarities likewise warrant comparative investigation in the future.

2. Pre-imperial coinage in ancient China

With regard to the mythical and semi-mythical distant past, later textual sources ascribe monetary uses to a variety of objects such as tortoise shells, cowrie shells, pearls, skins, teeth, horns, wheat, textiles, and stone tools.³ Archaeological evidence confirms the use of cowry shells (*bei*) since the Shang period (c.1600-1050 BCE) and especially during the Western Zhou Dynasty (c.1050-771 BCE). Assembled on strings of ten (*peng*), cowries gradually came to serve as a standard of value.⁴ It is less clear, however, whether cowries ever fulfilled the additional monetary function of a medium of exchange: they may primarily have been used as gifts and prestige items comparable to jade objects, and are mostly discovered in mortuary settings.⁵ Imitation cowries made of bone and later bronze already appeared in the late Shang period, although production did not peak until the Eastern Zhou period (770-256 BCE).⁶ Cowrie use was particularly widespread in Yunnan in the far south: 260,000 of them have been unearthed from tombs dating from before the Qin-Han period. Their presence strongly diminished under later Han rule but increased again afterwards; they did not disappear from that region until the final imposition of imperial control in the seventeenth century.⁷

Miniaturized tools that served as a store of value date back to the late second millennium BCE but most finds have been made in Western and early Eastern Zhou tombs.⁸ Spade blades that kept shrinking in size and weight were the most prevalent type. From the seventh century BCE these spades came to bear inscriptions (mostly the cowrie symbol *peng* and numbers): it is only from that point onward that monetary usage can safely be inferred. Spade money was produced in a number of distinctive shapes that may cast light on chronology and provenance but requires further study. In the late Spring-and-Autumn period, spades with square

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¹ Matters of monetary policy enjoy greater prominence in the ancient Chinese tradition than in Roman sources: for texts and discussion, see esp. Swann 1950 and Hu 1988: chapters 1-12 (China), and compare Nicolet 1971 and 1984 and most recently Wolters 1999: 350-71 (Rome).

² E.g., Maresch 1996; von Reden 2007.

³ Thierry 2003b: 25.

⁴ For examples, see Thierry 2001b: 118-9. However, Li 2006 argues that cowries did not become a standard of value until the middle Western Zhou period. Peng and Zhu 1995: 9-12 discuss the geographical spread of cowrie shells: use peaked in the Yellow River valley from the Shang into the early Spring-and-Autumn periods, waned in the Central Plain during the Warring States period, and ended under Qin and Han.

⁵ Thus Li 2006: 7, 11, 17-8.

⁶ Thierry 1997: 46-8, referring to over 27,000 specimens found in tombs of that period.

⁷ Yang 2004: 305-12.

⁸ Wang 1951; Thierry 1997: 49-65, 89-102; Peng 2000: 33-117.

corners represented the most common type, usually 7-10cm long and weighing 20-30 grams, whereas smaller specimens weighing around 5-7 grams were typical of the Warring States period.⁹ Knife-shaped money developed in the northern and northeastern reaches of China.

Monetization expanded in the increasingly competitive and dynamic environment of the Warring States Period (480-221 BCE). The main contenders for overall supremacy – Qi, Qin, and Chu – developed closed monetary systems, whereas the “Three Jin” states of Zhao, Wei, and Han experienced less governmental centralization and thus more local autonomy in money production. In Han and Wei, spade money was produced to a set weight standard (of 7, 14, 28 grams). Knives continued to be common in the northeastern states of Yan and Qi. Qi, Qin, and Chu all developed state-specific currency systems.¹⁰

Judging by the archaeological record, round coins appeared in the fourth century BCE in the states of the central Great Plain and subsequently came to be used in all major states except Chu in the south. Presumably modeled on earlier circular jade disks (*bi*) with small holes in the center, these coins were cast according to regional weight standards and often inscribed with their denomination or the name of the issuing city.¹¹ The state of Qin followed the *liang* standard, casting *banliang* (i.e., half-*liang*) coins with a target weight of approximately 8 grams, the weight being inscribed on the face of the coins. Later texts claimed that Qin Shihuangdi created this coin in 221 BCE, an erroneous conflation of the later imperial predominance of this type of coin with the circumstances of its creation. *Banliang* coins have been found in strata dating from the mid-fourth century BCE, more than a century prior to Qin’s imperial unification. They were introduced in a period of profound state-sponsored changes, and it is possible that a state monopoly was established or at least claimed in connection with the sweeping legalist reforms of Shang Yang in the 340s and 330s BCE.¹²

A divergent monetary system developed in the southern state of Chu, based on bronze cowries and coin-sized thin square plates of gold bearing punchmarks denoting the name of the currency (*yuan*) and the name of the Chu capital.¹³ The archaeological record suggests that both currencies circulated only within Chu. While the use of imitation cowries continued older local traditions,¹⁴ the circulation of gold in a quasi-coin format remained exceptional in China (although it also occurred farther south in Vietnam and may represent a regional and ultimately “foreign” custom). I discuss this evidence in more detail below (section 4.1).

Who issued these coins? The literary tradition conveys the impression that rulers (i.e., the state) made decisions concerning the issuing of money. Thus, it was possible to imagine that in

⁹ See the catalog in Thierry 1997: 194-7, 202-37. The bulk of Warring States cash was made up of small spade coins: *ibid.* 89.

¹⁰ Peng 2000: 183-207.

¹¹ Thierry 1997: 83-8. Jade disks as model: Wang 2004: 11; and cf. Thierry 1997: 84. (The National Museum of China in Beijing displays numerous *bi* that are barely larger than large bronze coins.) The early coins of Wei, Han and Zhao preserved the round hole characteristic of the jade disks whereas Yan, Qi and Qin opted for square holes.

¹² Thierry 1997: 165-75. In 336 BCE, the Zhou congratulated the Qin on issuing coins; but it is a modern presumption that this marks the *first* issue of such coins at Qin: Peng 1994: 76 n.2; Thierry 1997: 173. For Shang Yang’s reforms, see Li 1977. Thierry 1997: 173-5 distinguishes among seven types of Qin *banliang* coins. The oldest *banliang* coins (c.370s-340s BCE?) are large and heavy (usually in excess of 10g) and feature more “archaic” round holes. The most regular issues (7-10g) may date from the Shang Yang period. Underweight specimens from the late Warring States period dominate the archaeological record.

¹³ See below, section 4.1. Thierry 1997: 143 stresses the different character of this system.

¹⁴ Wei and Fang 1997 argue that the local miniature version of imitation cowries, known as “ant-nose” money and found in large quantities, served as the main currency of Chu, but maintain that it did not become common until the late Warring States period, and that use of genuine cowries had still predominated up to that point. Peng 2000: 150 also dates these *yibi* coins to c.330-223 BCE. See also Thierry 1997: 143-6.

524 BCE, King Jing of Zhou replaced “light” coins with “heavy” coins, thereby somehow allegedly depriving his subjects of their property.¹⁵ The *Guanzi*, a series of dialogues set in the seventh century BCE but believed to be composed at the Jixia Academy in Qi in the fourth and third centuries BCE and collated in their final form in the first century BCE, emphasizes the desirability of state control over the money supply. This position is normally envisioned as the ruler’s control over the circulation of an existing stock of money rather than as policy-making regarding the manufacturing of money per se. For instance, in order to establish desired price levels, the ruler was meant to manipulate the money supply and hence prices by hoarding or spending cash rather than by issuing or demonetizing coin.¹⁶ It has been argued that at least early on, merchants manufactured coins, employing regional weight standards. However, circumstantial evidence suggests that by about 300 BCE, Qin and Qi had established state control over coin production. The situation in the other states remains obscure, although high levels of uniformity within each polity may speak in favor of significant government involvement throughout the region.¹⁷ In textual sources covering the pre-imperial period, cash is rarely mentioned in elite contexts, and no state salaries in cash are recorded.¹⁸ This interpretation is supported by the fact that for much of the first 80 years of the Han Dynasty, private individuals were permitted to make coins, and that the state only gradually entered this market (see below).

Under these circumstances, given both the likely involvement or perhaps even predominance of private coin manufacturers, and the initial political fragmentation of the region later encompassed by the Qin and Han empires, a wide variety of currencies and denominations must have been in circulation during the Warring States period, and coins would not always – indeed not normally – meet target nominal weight standards. We have no information about the metal prices of the constituent elements of these coins (such as copper and tin) or about the relationship between their intrinsic value and their face value. The fact that coins were repeatedly cast in keeping with prevailing regional weight standards and even marked as such indicates that their face value was at least in theory meant to represent their metal value, always allowing for a degree of seigniorage to defray production costs and latent vulnerability to weight debasement driven by public and private profit-seeking.

Legal provisions of the Qin state dating from before 242 BCE that were discovered in a tomb at Yunmeng in 1975 shed light on this issue.¹⁹ The pertinent section of this text (the *Jinbulu*) holds that round coins (i.e., presumably the *banliang* coins of that period) were to be accepted regardless of whether they were “fine” or “bad” (i.e., heavy or light), and that it was illegal to sort coins according to size and weight: “When commoners in their deals use cash, fine and bad (pieces) are to be used together; one should not venture to differentiate between them.”²⁰ This text demonstrates three things: that coins deviated from conventional weight standards (which is amply confirmed by archaeological data); that people valued and hence exchanged coin according to its weight as a proxy of its metal value; and that the Qin state, a mere generation prior to its final victory, sought to reduce transaction costs by upholding the preeminence of the face value of coin vis-à-vis its intrinsic value. The Qin state may well have attempted to define its coins as fiduciary money whose exchange value was meant to be divorced from its metal content.

¹⁵ *Hanshu* 24B: 2a-b in Swann 1950: 225-8; cf. Peng 1994: 91-2.

¹⁶ *Guanzi* 74 “Shanguogui” 3.71, in von Glahn 1996: 33. See also the passage cited in the previous note, and more generally Hu 1988: 133-8.

¹⁷ Peng 2000: 155-61. Thierry 1997: 172 notes that the spread of *banliang* coins matched the expansion of the Qin state. However, even in Qin coin issues by vassals and members of the ruling family were permitted: Thierry 2003a: 24.

¹⁸ Peng 1994: 87; and Lewis 1999: 374-5 n.53 for salaries in grain.

¹⁹ Translation and commentary of the Shuihudi texts in Hulsewé 1985a. See also Hulsewé 1985b: 227-9; Thierry 1993: 3-4, 1997: 168-70.

²⁰ Hulsewé 1985a: 52.

However, it is naïve to maintain that this establishes the fiduciary character of this monetary system:²¹ the very existence of this law points to the contrary aspirations of money users who accorded greater significance to intrinsic value. This reading receives support from Jia Yi's memorial of 175 BCE and other evidence that will be presented in the following sections. At the same time, this should not be taken to imply that the state was completely unsuccessful in imposing the principle of freely interchangeable mixed-quality coins of uniform face value: textual references to a unit called *pen* – 1,000 coins in a large basket or pot – have been validated by the discovery, in Shaanxi Province, of a pot that contained exactly 1,000 coins of various weights and sizes. 997 of them were *banliang* coins of Qin: about one-fifth of them weighed around 6 grams or more (up to 10g) while the others weighed in at less than 5 grams, and in 6 percent of all cases at less than 3 grams.²² Another jar with 1,000 *banliang* coins has since been found in Gansu province.²³ The *Jinbulu* (§65) states that it was the state authorities who mixed 1,000 “beautiful and ugly” coins in a container and then sealed it, but also that these containers were to be opened if the government needed to use their contents: hence, coins re-entered circulation not in opaque packages but as individual objects, and intermittent random “baggings” were hardly sufficient to curtail more discriminate money use in market transactions. The very fact that most coins in the Shaanxi pot – and more generally in the archaeological record²⁴ – are significantly underweight casts doubt on the notion that they could readily have circulated at their nominal value. Given the continuing persistence of coin weighing (see below, section 3.1), the most likely scenario may be one of an uneasy mix of state-enforced rules and private preferences that ultimately depended on the willingness and ability of the state to enforce fiduciary exchange practices. In this regard, late Qin, with its powerful and ambitious state apparatus and strong legalist tradition, may well have occupied an unusual position within the Chinese state system.²⁵ Later (albeit admittedly much more extravagant) attempts of the Han state to dissociate face value from metal value invariably yielded disastrous results (see below, sections 3.2-3), thereby highlighting the limits of the coercive capabilities of the imperial state. I return to this problem farther below in a more general discussion of the limits of fiduciary money in the Chinese and Roman economies (section 8).

3. The bronze currency of the Qin-Han period

3.1. Monetary developments under the Qin and the early Western Han

Upon the completion of the Qin takeover in 221 BCE, the *banliang* coins of Qin were meant to be the only legal tender other than gold (which was however not cast in coin form: see below, section 4.2). Inevitably, coins of different size and weight continued to circulate, and even the *banliang* coins themselves varied in these respects, usually by falling short of the target weight.²⁶ This may well reflect the inevitably huge financial exertions of the Qin state in taking over its rivals in the third century BCE: from a comparative perspective, it would be truly remarkable if the kind of depreciation that commonly ensued in other historical societies that faced massive military challenges could somehow have been avoided by the late Qin kingdom.

²¹ *Contra* Thierry 1983; 2001b: 126-33.

²² Thierry 1997: 170 and 2001b: 129-30.

²³ Thierry 1997: 171.

²⁴ Cf. Thierry 1997: 172 for a find of 645 *banliang* coins in Shanxi, 5 percent of which were regular, 14 percent heavy, and 81 percent underweight.

²⁵ Bodde 1986; cf. Fu 1996.

²⁶ Swann 1950: 228 n.386.

More research is required to shed light on this process.²⁷ If some greatly underweight *banliang* issues were indeed associated with Qin Shihuangdi's short-lived successor,²⁸ this would document the first of several crisis-driven debasements of the imperial period.

When the Han seized power, the gold-bronze system was maintained. In general, we observe strong continuity from the Qin into the early Han periods.²⁹ Since Qin money was considered “heavy” (i.e., scarce), and “difficult for practical purposes” (whatever that means), the first Han emperor allowed – or in any case was in not in a position to deny this right to – his subjects to cast their own coins.³⁰ Down to the 110s BCE, a large number of mints existed side by side: the imperial palace, individual princes, vassal kings, and private operatives all contributed to the overall coin supply. Given the wide spread of coin weights at the time (and in the light of the episode of 175 BCE discussed below), the weighing of coins (and thus usage according to metal value) may be presumed to have been common. It is possible that the price inflation recorded for this period was due not so much to hoarding³¹ as to the inflationary consequences of issuing underweight coinage at (much?) higher face value. This association is repeatedly established in later texts.

The historiographical tradition as represented by the *Shiji* and the *Hanshu* ascribes a whole series of monetary measures to early Han rulers. Resultant attempts to match the archaeological record to these reports have confined numismatic study of this period to a literature-centered interpretive framework that has made it difficult to analyze the material evidence on its own terms.³² More than anything else, the dispersed nature of coin production militates against overly schematizing categorization.

Thus, when the sources claim that in 186 BCE, an 8-*zhu* coin (*bazhu banliang*, theoretically c.5.2g) bearing the customary *banliang* inscription (signaling a – notional – weight of 12 *zhu*) was issued, this need not indicate a significant break from existing practice: after all, many *banliang* coins of the Qin period de facto already conformed to a similar weight standard.³³ Four years later, we are told, a *wufen* coin (i.e., 5 *fen* or 1.18cm in diameter) was introduced.³⁴ Since a “former” prohibition of private coining is alluded to in an episode set in 175 BCE, it is possible that these reforms were accompanied by such a decree.³⁵ If true, this might have constituted an attempt to stem the inflationary slide of coin weights by imposing tighter state control or, conceivably, to secure seigniorage on the scale of one-third by compelling users to accept a 8-*zhu* coin at a 12-*zhu* face value.

In 175 BCE, the emperor Wendi introduced a 4-*zhu* coin (*sizhu banliang*) whilst lifting the prohibition on private coining.³⁶ These coins likewise bore the legend *banliang*, implying a face value three times as high as their metal value. Thus, over the first thirty years of the Han period, we observe a gradual official depreciation of coinage that presumably aimed to catch up with the de facto decline of actual coin weights. The *banliang* coin was re-tariffed from an original (but already largely illusory) Qin target weight of 12 *zhu* that had only occasionally been approximated by state authorities to more realistic standards of 8 *zhu* and then 4 *zhu*.³⁷ In analogy

²⁷ See now Peng 2000: 175-9.

²⁸ Thus He 1996.

²⁹ Thierry 2003a: 21.

³⁰ *Hanshu* 24B: 3a, for “elm-pod” coins set at 3 *zhu* (c.1.95g); cf. Peng 1994: 102.

³¹ As alleged in *Hanshu* 24B: 3a.

³² Thierry 2003a: 21, 27 stresses this problem.

³³ Swann 1950: 378; Peng 1994: 102. See Thierry 2003a: 28 for continuity.

³⁴ See Thierry 2003a: 28-9.

³⁵ Peng 1994: 102.

³⁶ *Hanshu* 24B: 3b. Thierry 2003a: 29 refers to a find of 100 coins of 2.7-3.3g in a tomb dating to 167 BCE that may reflect this new standard.

³⁷ Note that the 33 *banliang* coins dating from 179 to 118 BCE catalogued by Thierry 2003a: 163-71 average 2.6g or exactly 4 *zhu*.

to similar events in the Roman empire from the third century CE onwards (see below, section 6.1), these reforms might best be understood as attempts to catch up with inflationary price increases caused by underweight coinage by adjusting official weight standards downwards as well.

For the same year, 175 BCE, the *Hanshu* preserves a memorial presented to the court by Jia Yi, arguing for the re-imposition of a state monopoly on coinage.³⁸ This text provides invaluable context for our understanding of the workings of the monetary system of the early Han period. It notes the existence of moderately severe penalties (face tattoos) for individuals who debased coins by adulterating the prescribed bronze alloy with lead and iron but points out that some measure of debasement was required to motivate private individuals to manufacture coins in the first place. As a result of the resuscitation of private coining, this offense had supposedly greatly proliferated and private coin production had been boosted to the extent that many people abandoned other professions to make coins.³⁹ Yet the lack of a state monopoly was considered undesirable for another reason also: “Coins which the people are using vary from province to province, and from county to county. In some places the coins used are [so] light that to every one hundred of them must be added a certain number. In other places those used are [so] heavy that it is impossible to balance them equitably.” Official weight standards were ignored and officials could not simply impose arbitrary exchange rates which – as the author points out – they could not hope to enforce. This text, which purports to refer to actual conditions instead of simply reporting official pronouncements, flatly contradicts the notion that users habitually accepted coins at their face value: rather, the actual exchange value of money was determined by its weight – i.e., its (presumed) metal value (barring adulterations) –, and money users exchanged coins of different quality by adjusting their face value according to weight. This created persistent discrepancies between nominal values and prices and “real” exchange values.

A modern observer might expect this problem to have been alleviated in the long term by the effect of Gresham’s Law: light coins ought to have driven heavy ones out of circulation, allowing the latter to be profitably re-cast according to lower standards. Jia Yi, however, seems more concerned with the distress arising from the necessity to punish so many counterfeiters than with the money supply per se. In the first-century BCE *Yantielun*, an interlocutor links variations in coin weight to the inexperience of peasants who “have faith in the old and suspect the new” and “do not know the false from the genuine,” and are consequently cheated by merchants who “barter the bad [cash] for the good; for half make an exchange for double the amount.”⁴⁰ This points to serious equity issues arising from the circulation of debased coinage, especially in the context of a regionally fragmented monetary system that would eventually rely on the massive coin production levels of the first century BCE to achieve some measure of empire-wide coherence and uniformity, and of a gradual expansion of money use into the agricultural sphere driven by the monetization of taxation. In this scenario, knowledgeable intermediaries were in an excellent position to manipulate money exchanges to their own advantage. Jia Yi’s proposed solution to this problem was extreme (and duly rejected) – a state monopoly not merely on coin-production but on the possession of copper as well. A mere monopoly on coining without cutting off the copper supply to prevent counterfeiting was considered insufficient because it would lead to a scarcity of (legal) coin that would in turn increase the benefits of (illegal) private coin production: “Upon promulgation of the law to prohibit the casting of money, then coins would surely be heavy [i.e., scarce]. When [coins are] heavy, then the [counterfeiters’] profits are

³⁸ *Hanshu* 24B: 3b-5b, in Swann 1950: 233-9.

³⁹ This is a common and no doubt largely fantastic claim of the *Hanshu*.

⁴⁰ Gale 1931: 29; Peng 1994: 176. In this context, this point is made to argue against a state monopoly on coin-making (that allows fraudulent mint officials to manipulate the quality of coins?); but it is clear that it applies even more so to the context of private coining, despite the author’s strange contention that people were “happy” in the good old days when many different coins were in circulation.

excessive. Thieving counterfeiters thereupon will arise like clouds. Even execution in the marketplace will not in itself be enough to prevent it.” From his early Han vantage point, Jia Yi was unable or unwilling to consider alternative options, such as a huge increase in the public money supply to avoid deflation and the introduction of technical features such as precise coin standardization that would raise the cost of effective counterfeiting – or, in other words, the solutions that eventually came to be adopted from the 110s BCE onward.

Greater state control over the money supply was thought to entail a variety of benefits, such as the ruler’s supposed ability to adjust prices by increasing or reducing the money supply,⁴¹ as well as increased levels of trust in this medium of exchange: “if the coinage is unified, the people will not serve two masters; if the coinage proceeds from above, then those below will not be in doubt.”⁴² Political aspects also deserve attention. “To allow the people to make coins is to have the ruler share his authority with them: this cannot be done for long.”⁴³ That this was more than just an abstract concern is made clear by the report that in the second quarter of the second century BCE, the client king of Wu “went to [local] mountains [for copper] and cast coins. His wealth rivaled that of the Son of Heaven. Later, eventually, being disobedient, he revolted.”⁴⁴ This curt comment refers to the so-called “Revolt of the Seven Feudatories” in 154 BCE that temporarily threatened to pit a coalition of powerful vassal states encompassing the south-eastern half of the Han empire against the central government.⁴⁵ Yet despite the potentially subversive features of private coining, the custom continued into the reign of emperor Wudi (140-87 BCE).

3.2. The monetary reforms of the 110s BCE and the late Western Han period

For four years following his accession, from 140 to 136 BCE, Wudi promoted an even lower 3-*zhu* standard that was, for the first time, explicitly advertised on the face of the coins before returning to the 4-*zhu* ‘*banliang*’ coin of 175 BCE.⁴⁶ The circumstances surrounding this measure are obscure. A much later source (dating from the thirteenth century) claims that these 3-*zhu* coins were used more than the coins cast on the restored 4-*zhu* standard,⁴⁷ an observation that is consistent with Gresham’s Law, assuming uniform face value. Substantial reforms were implemented in the 110s BCE in the face of massive war-related expenses. Wudi’s switch to an aggressive military strategy to defeat the Xiongnu boosted governmental need for revenue.⁴⁸ In 119 BCE, the 4-*zhu* *banliang* coin was abolished and melted down and was replaced by a 3-*zhu* coin, to be cast by the central government, which lasted for between one and five years. The likely motive was further depreciation of the intrinsic value relative to the face value.⁴⁹ However, in 118 BCE, Wudi introduced a 5-*zhu* standard (*wuzhu*, at 3.2-3.3 grams), inviting governors and vassals to cast coins (the *junguo wuzhu*) according to this new and elevated standard. What would have been their incentive to do so is an open question, especially if lighter coins continued to circulate or even be produced. Unfortunately, owing to somewhat divergent accounts in the pertinent sources, the precise chronology of some of these changes remains uncertain.

Even so, it seems very likely that one way or another, the reforms of 119/118 BCE aimed to increase government revenue for warfare by manipulating the monetary system. This

⁴¹ At *Hanshu* 24B: 5b, going back to the *Guanzi* tradition (cited above).

⁴² *Yantielun*, in Gale 1931: 28-29; Peng 1994: 176.

⁴³ *Hanshu* “Biography of Jia Shan,” in Peng 1994: 177.

⁴⁴ *Hanshu* 24B: 5b-6.a.

⁴⁵ Emmerich 2002.

⁴⁶ Thierry 2003a: 29.

⁴⁷ Swann 1950: 379.

⁴⁸ For context, see Barfield 1989: 54-9; Di Cosmo 2002: 206-52; Chang 2007: 67-134; and cf. Lelièvre 2001 for Wudi’s reign in general.

⁴⁹ Cf. Peng 1994: 103 n.3.

interpretation is supported by the fact that at the same time the state also introduced novel forms of non-bronze token money known as “white metal” and “hide money,” reportedly to reduce the state deficit.⁵⁰ The latter variety appears to have been a fairly straightforward money-spinning scheme designed to increase the government’s share of the surplus appropriated by the empire’s ruling class. Made of the hides of white deer kept in the emperor’s park, a square-foot piece of hide was priced at 400,000 cash and handed out as gifts to nobles visiting the court who were expected to return the favor with gifts of genuine value. As such, “hide money” cannot have had any significant impact on the general monetary system. “White metal” (*baijin*) was the term used for what was – supposedly – China’s earliest coined silver money. Made of an alloy of silver and tin, it came in three denominations, the round “dragon” coin weighing 8 *liang* (c.125g) and valued at 3,000 cash (i.e., 3,000 4-*zhu* coins), the square “horse” coin for 500 cash, and the oval “tortoise” coin for 300 cash. However, far from containing any significant amount of silver at all, round “dragon” coins that have appeared in the archaeological record are either made of bronze or of lead and tin.⁵¹ This shows these types were conceived of as pure token issues. This is consistent with – necessarily exaggerated – reports that as a result, counterfeiting of the new coins took off on a dramatic scale: “several hundred thousand” people were supposedly condemned to death for counterfeiting, and “over a million” others were cleared or pardoned, while “the law breakers had become so numerous that the authorities had been unable to inflict punishment upon them all.”⁵² Be that as it may, “white metal” was consequently abolished soon after its inception, in 117, 115, or 113 BCE.⁵³ Even allowing for rampant hyperbole, this story probably contains a kernel of truth: the introduction of token coinage would have created massive incentives for counterfeiting. Nevertheless, it is perhaps more likely that the detrimental effects of “White Metal,” whilst negligible, were grossly exaggerated in the more general context of the failure of other forms of token money that had been introduced at roughly the same time, such as the greatly overvalued “red-rim” bronze coin.⁵⁴

As was to be expected, the new 5-*zhu* coin was undermined by underweight versions “criminally counterfeited” by “the people.”⁵⁵ In response, in 115 BCE the central government launched its own version of the 5-*zhu* coin, valued at 5 cash or 5 times the previous (provincial) *junguo wuzhu*, and known as the “red-rim” coin (*chice wuzhu*). While the exact meaning of this term is obscure,⁵⁶ the context shows that it must refer to some kind of safety feature that was supposed to protect these token coins from counterfeiting. The authorities apparently appreciated that the creation of a token coin would greatly increase the incentives for counterfeiting and sought to prevent this from happening. Moreover, the underlying objective – to replace existing metal coins by more heavily overvalued token coins to shore up the imperial budget – can hardly be in doubt: as only these coins were to be “allowed to circulate for payment of taxes and official use” and only the government was meant to be able to manufacture them, existing full metal coins would have to be handed over to the authorities (for re-melting and re-issuing at a much

⁵⁰ Peng 1994: 105-6, 152; Thierry 2003a: 31-2.

⁵¹ Thierry 2003a: 31 references a find of 1 round coin with a dragon motif, 3 square “horse coins” and 1 oval “turtle” coin in Changxingzhen in Shaanxi in 1990. Their weights of 118.5g to 21g to 15g are very roughly proportional to their nominal value, with a silver content of a mere 6 percent, compared to 40 percent lead and 38 percent tin. Moreover, some 300 round bronzes with dragon motifs (ranging in weight from 105 to 142g) have been found in other settings. Their design may have been borrowed from Greco-Bactrian issues (ibid. 32).

⁵² *Hanshu* 24B: 13a; Peng 1994: 153.

⁵³ The date is unclear: Swann 1950: 384; Peng 1994: 153 n.5.

⁵⁴ Sima Qian, the *Hanshu*’s main source for the reign of Wudi, had been castrated under this ruler, which is known to have affected his judgment of Wudi’s actions and their consequences. For Sima Qian’s methods, see in general Durrant 1995 and Hardy 1999.

⁵⁵ *Hanshu* 24B: 14a.

⁵⁶ Cf. Peng 1994: 106; Thierry 2003a: 34-5.

higher face value) in exchange for the new token coins. However, “two years later the red-rim coins became worthless, the people having ingeniously [evaded] the law. Their use was of no advantage, and so they were demonetized.”⁵⁷ We can only suspect that the people’s “ingenious” subversion techniques either involved some way of manufacturing credible copies of these token coins or their continuing insistence on exchanging coins according to their metal value.

In the meantime, the new salt and iron monopoly of the central government set up in 117 BCE may have increased revenues sufficiently to permit the state to abort its failed experimentation with token coinage.⁵⁸ In or around 113 BCE, coin production by the provinces and fiefs was outlawed. By 112 BCE, a government monopoly on coining had finally been established. Henceforth, all legal tender was to be cast by the central mint in the capital, Chang’an, or its subsidiaries, and all earlier coin was – at least in theory – demonetized. From that point onwards, the monetary system stabilized, and counterfeiting reportedly fell to much lower levels. A convergence of several factors accounted for this development: the abolition of overt token coinage reduced incentives for counterfeiters; central minting curbed fraud and raised faith in the official currency; and technological advances further diminished the appeal of counterfeiting by raising production costs for criminals. Bronze molds were used to produce large numbers of identical clay molds used to cast highly uniform coins that were now endowed with raised rims and perfectly smooth rims.⁵⁹ Once large numbers of these coins had been put into circulation, poorly crafted fakes were more likely to face rejection while the production of credible copies became difficult and costly.

Whereas complete withdrawal of existing coins must have been hard to achieve, the central government eventually succeeded in imposing a uniform standard by raising coin output to enormous levels. Between 112 BCE and the opening years of the first century CE, over 28 billion *wuzhu* coins were said to have been produced by the state,⁶⁰ for a mean output of 230 million (or 750 tons of metal) per year or 7 to 8 coins per second.⁶¹ It was in that period that the Han achieved monetary unification across much of their far-flung territory. Although usable data are scarce, price stability appears to have maintained for much of the first century BCE. This system required fiscal discipline at the central mint and was therefore sensitive to changes in revenue requirements: thanks to the return to the tribute system to appease the Xiongnu after Wudi’s reign, dramatic spikes in funding demands were absent, and the temptation to devalue (and thus trigger counterfeiting and inflation) was curtailed: although mean coin weights steadily decreased during this period, they did so only very slowly and gradually.⁶² Thus, despite (ideologically driven) Confucian complaints about malfeasance and incompetence at the central mint – “officials and artisans alike steal from the profits of the mint; moreover, they fail to ensure that coins are made to exact standards”⁶³ –, this arrangement ensured stability for as long as the imperial budget was reasonably well balanced.

⁵⁷ *Hanshu* 24B: 14a.

⁵⁸ Wagner 2001; cf. Peng 1994: 153-4.

⁵⁹ Peng 1994: 117; Thierry 2003b: 56. The filing of rims commenced in 115 BCE: Thierry 2003a: 36-7.

⁶⁰ *Hanshu* 24B: 19b.

⁶¹ These rates, albeit very high, are consistent with an annual output of 327 million coins in the Tang period and dwarfed by the scale of coin bronze production under the Northern Song: see below, section 9.1. Han bronze coins were also minted at other locations, including a site in southwestern China in close proximity to rich copper mines: Jiang 1999. For the debate over the precise location of the main mint in Chang’an, see the references gathered in *China Archaeology and Art Digest* 4.2-3, 2001: 287-8.

⁶² See below, section 8 and esp. Fig. 4.

⁶³ *Yantielun* 4, in van Glahn 1996: 36.

3.3. The monetary reforms of Wang Mang

This equilibrium was upset during the usurpation of Wang Mang (6/9-23 CE) who sought to establish his own new dynasty, Xin, to replace the Han.⁶⁴ Internal resistance and renewed external conflict increased fiscal needs while unrest interfered with revenue collection. This led to a whole series of bewilderingly complex currency reforms that were compressed into a short period from 7 to 14 CE. All of them revolved around the introduction of new token coins at varying degrees of overvaluation.⁶⁵

The first reform, during Wang Mang's regency in 7 CE, created three new denominations: the *daqian*, a 12-*zhu*-weight coin valued at 50 times the face value of the Han *wuzhu* coin (i.e., overvalued 21 times), and knife-shaped coins (a deliberate revival of a pre-Han format) weighing either 16-17g and valued at 500 Han *wuzhu* (i.e., overvalued c.100 times) or 28-29g and valued at 5,000 (i.e., overvalued c.560 times not counting the minuscule amount of gold inlay in the inscription).⁶⁶ This array co-existed with the Han *wuzhu* coin valued at 1 cash. Private ownership of gold was outlawed, and subjects were to submit their holdings to the treasury in exchange for cash. It may be that the new large-denomination token coins were designed to absorb private gold at low cost. One wonders to what extent this regulation could be enforced; however, reports of huge stocks of gold at the end of Wang Mang's reign (see below, section 4.2) seem to suggest that the government was not entirely unsuccessful in this endeavor, although compulsion would may well have been a more important factor than faith in the new token currency. In any case, we are told that the creation of token coins was immediately followed by a surge in counterfeiting.⁶⁷

Upon his accession to the throne in 9 CE, Wang Mang abolished the *wuzhu* coin as well as his own knife coins. The former was replaced by a 1-*zhu* coin valued at 1 cash (i.e., equivalent in face value to the now demonetized Han *wuzhu* coin, and thus overvalued 5 times). The *daqian* continued to circulate. This reform removed the vastly overvalued knife coins once they had accomplished whatever they could do to draw cheap bullion into the treasury,⁶⁸ shifting instead to a low-denomination token coin of far greater potential for widespread use that consequently promised new streams of revenue.⁶⁹ In order to curtail counterfeiting, private possession of copper or charcoal was prohibited,⁷⁰ a patently impracticable injunction that the state could hardly hope to enforce. The new 1-*zhu* coins met with a predictable response: owing to the minimal intrinsic value of the new denomination, the population continued to use the Han *wuzhu* coins that must have been available in abundance.⁷¹ In consequence, the new coins "finally did not circulate."⁷² Hoarders of Han coins were to be deported to the frontiers and large numbers of counterfeiters received harsh penalties.⁷³

In 10 CE, massive war preparations against the Xiongnu prompted a new round of monetary reforms. By creating an extraordinarily complex new system comprised of 28 different denominations of generally extremely overvalued coins, the state appears to have sought to boost

⁶⁴ For Wang Mang's career in general, see Thomsen 1988.

⁶⁵ For detailed discussions, see Dubs 1955: 507-18; Thomsen 1988: 88-90, 117-24; Peng 1994: 110-4, 157-9; Ehrend 2000; Thierry 2003a: 41-7.

⁶⁶ The gold inlay did little to mitigate overvaluation: even if the entire coin had been made of solid gold, it would have had to be between two and four times as heavy as it actually was to be worth its weight in Han *wuzhu* coins (cf. below, section 4.2, for the probable cash value of gold).

⁶⁷ *Hanshu* 99A: 30a.

⁶⁸ Cf. Peng 1994: 158.

⁶⁹ Cf. Thomsen 1988: 119.

⁷⁰ *Hanshu* 99B: 7b.

⁷¹ *Hanshu* 99B: 9a.

⁷² *Hanshu* 99B: 14b.

⁷³ *Hanshu* 99B: 9a.

revenue in the run-up to the campaign. The new system featured gold and silver ingots, tortoise shells and cowry shells of paired value, and sixteen different kinds of bronze coins (six of them round and ten spade-type). As in the previous year, the basic unit was a 1-cash piece weighing 1 *zhu* but equivalent in value to the discontinued *wuzhu* coin. The degree of overvaluation of higher denomination pieces rose with their face value: from 1,567 percent for the 10 round cash coin weighing 3 *zhu* to a staggering 20,733 percent for the 1,000 cash spade coin weighing 24 *zhu*.⁷⁴ It is telling that the top-valued spade coin (equivalent to 1,000 cash) survives in far greater numbers than the other nine denominations in that format, either because the government put particular emphasis on the most overvalued denomination or because counterfeiters did.

The success of this reform is unclear. On the one hand, later Han sources aver that private users rejected most of these new currencies and counterfeiting was rife. This account entails a paradox: the new token coins could not have been widely rejected *and* have brought profit to counterfeiters at the same time. More importantly, the former claim is inconsistent with the large numbers of spade coins that have been recovered not merely all over eastern China but even in Korea.⁷⁵ In reality, for a few years the 1,000-cash spade coins, the 5-cash *daqian*, the 1-cash *xiaoqian*, and the Han *wuzhu* circulated side by side. (Nevertheless, the sheer amount of *wuzhu* coins put into circulation during the previous century leaves little doubt that Han currency dominated the economy throughout the short-lived Xin period.) Later on, the *Hanshu* painted a gory picture of the draconian measures that were needed to impel acceptance of the new coin issues: not only was a counterfeiter's family to be executed but five neighboring families were to be enslaved as well.⁷⁶ Travelers were supposedly required to carry spade money and were checked at roadblocks. Court officials all had to have them on them when they entered the palace. It would seem that a currency system in need of such bizarre means of compulsion was clearly doomed to failure. However, it is well known that the historiographical tradition under the restored Han was hostile to Wang Mang's regime, and we must therefore surely allow for a large degree of hyperbolic distortion.⁷⁷ Moreover, even if regulations such as these had indeed been passed, it is unclear to what extent they could ever have been enforced. Nevertheless, even if we discount the more lurid details of Ban Gu's account, the extreme levels of overvaluation inherent in the new currencies suggests a priori that these reforms had scant prospect of success. The rapid pace of change must have further undermined trust in new denominations.

Soon thereafter, Wang Mang, allegedly aware that "the common people hated [his arrangements]," temporarily suspended most of the newly introduced denominations and retained only the 1-cash and 50-cash coins for circulation.⁷⁸ We can only speculate that his subjects would subsequently alienate overvalued coins to pay their taxes (at their nominal value) while government officials who received half of their salary in cash would feel the pinch when the coins they received failed to be accepted at face value in private transactions. In 14 CE these two token coins were abolished as well and replaced by the *huoquan* weighing 5 *zhu* and worth 1 cash (i.e., essentially the old Han *wuzhu* coin) and a fiduciary spade coin (*huobu*) of 25 *zhu* valued at 25 cash, and thus overvalued by a factor of five. The existing 1-*zhu* coin simply ceased to be count as legal tender whereas the 12-*zhu* 50-cash *daqian* was to circulate for another six years at a reduced value of 1 cash. The latter provision was particularly odd given that it undervalued the

⁷⁴ Dubs 1955: 491.

⁷⁵ Thierry 2003a: 44. Cf. also Wang 2004: 28 for the presence of (round, though never spade) issues of the Wang Mang period in eastern Central Asia.

⁷⁶ *Hanshu* 99B: 15a.

⁷⁷ Historians of China have commonly insisted on the veracity of the historiographical tradition regarding Wang Mang (see the survey in Thomsen 1988: 9-14), despite the fact that these accounts were composed under the restored Han dynasty – hardly *sine studio*. Thierry 2003a: 42 rightly urges skepticism.

⁷⁸ *Hanshu* 24B: 21b. This statement is particularly hard to reconcile with the survival of numerous spade-coins.

coin relative to the others in terms of metal value. As a result, both denominations were likely to be melted down and re-cast to manufacture counterfeit 25-cash spade coins. As the impractical ban on private ownership of copper and charcoal had already been rescinded in 13 CE and penalties for counterfeiting were significantly reduced in 14 CE, illicit production of the new spade coins presumably continued for as long as this denomination was in circulation. In response, penalties were raised again, providing for the enslavement (to the mint in Chang'an) of any culprit's five neighboring families.⁷⁹

Since we lack price data for this period it is impossible to determine whether successive waves of token coins drove up market prices, although extremely high (albeit possibly symbolic and/or deliberately inflated) prices for rice and grains are reported for the latter years of Wang Mang's reign.⁸⁰ Enough Han coins may have been available to maintain pre-Xin price levels. In that case, 1-*zhu* coins valued at 1 cash could have been used as de facto fractional coinage, at five to a *wuzhu* coin, and larger denominations avoided. However, in as much as new coins with higher face values were in use and the government was able to enforce acceptance of fiduciary coins, their presence ought to have had an inflationary effect. Specimens of Wang Mang's currencies survived in greater numbers than Wudi's elusive "white metal" issues and cannot have been completely sidelined by money users even during their very short period of circulation. The consequences of successive demonetizations must have been particularly severe for members of the elite who had come to hold high-denomination token coins that subsequently lost their value. The resultant fall-out need not have been entirely unintentional, as Wang Mang sought to accumulate precious metal stocks in exchange for token bronze coins and more generally aimed to undermine the existing aristocracy in order to benefit his own supporters.⁸¹ Just as in the early 110s BCE, experimentation with token coins had failed to produce lasting benefits for the treasury and had met with widespread rejection in the general population and increased counterfeiting. At the same time, short-term financial and political gains may indeed have accrued to the new regime. Even so, long-term monetary stability was predicated on a return to the far more "metallistic" coinage system of the late Western Han.

3.4. Conditions under the Eastern Han

After 25 CE, the restorer of the Han Dynasty, Liu Xiu, continued to use the 5-*zhu huoquan* that was functionally equivalent to the former Han *wuzhu* denomination.⁸² Production of *wuzhu* coins finally resumed in 40 CE under the control of the superintendent of agriculture.⁸³ No output figures are available for the Eastern Han period. A return to low grain prices by the mid-first century CE signals monetary stability.⁸⁴ In the second century CE, intense warfare against the western Qiang created extraordinary military expenses: 14 years of campaigning in the early second century CE absorbed 24 billion cash, almost equivalent to total cash output during the last 120 years of the Western Han, followed by another 8 billion from 140 to 145 CE and 4.4 billion in the late 160s CE.⁸⁵ Once again, military needs prompted calls for debasement via "large coins," but on this occasion, in the reign of Huandi (147-168 CE), the government resisted such

⁷⁹ *Hanshu* 24B: 25b.

⁸⁰ Peng 1994: 159.

⁸¹ Cf. Thomsen 1988: 90, 105-8.

⁸² This coin type is common in finds up to the mid-first century CE: Thierry 2003a: 44. A sample of 53 of these coins *ibid.* 194-8 averages 2.63g, light by Western Han standards but fairly close to the moderately underweight Eastern Han *wuzhu* of c.2.8-2.9g: see below, Table 1.

⁸³ Thierry 2003a: 49-54.

⁸⁴ Peng 1994: 160.

⁸⁵ Peng 1994: 161. For context, see de Crespigny 1984: 76-172.

schemes.⁸⁶ Instead, the authorities developed the so-called “reduced-hundred” system based on units of 100 cash that entailed the use of fewer than 100 actual coins.⁸⁷ This accounting fudge became more common in later periods of Chinese history.⁸⁸ Local issues eventually re-appeared under emperor Lingdi (168-189 CE). This process, together with the growing erosion of central state power, precipitated significant weight loss.⁸⁹

3.5. Epilogue: Later monetary developments

Although the *wuzhu* tradition was reportedly maintained in the northern successor state of Wei (221-280 CE) after the collapse of the unified empire, no actual specimens have been safely identified.⁹⁰ Conversely, the other two kingdoms, Han-Shu and Wu, experienced a rapid deterioration of their respective monetary systems. In 236 CE, Wu issued *daquan* valued at 500 cash (*daquan wubai*), followed by a 1,000-cash issue (*daquan dangqian*) two years later. Even more overvalued token coins of 2,000 cash and 5,000 cash followed in the 240s CE.⁹¹ We can only conjecture that accelerating inflation and unmet fiscal demands lay behind this increase in face value. In 246 CE, the state suspended coin production altogether and demonetized the top-valued denominations.⁹² These developments once again illustrate the unfeasibility of a pure token coinage. According to textual sources, in the territory of the later Han-Shu state token coins valued at 100 cash were cast as early as 214 CE. However, it has proven difficult to relate surviving specimens to this tradition, although it has been claimed that the weight of regional issues gradually declined.⁹³ Scarcity of new coin characterized the Jin period (280-317 CE): hoards of the period predominantly contain Han coins supplemented by Xin and Han-Shu issues.⁹⁴ Silk and other textiles as well as grain served as the primary media of exchange and stores of value during the fourth and fifth centuries CE, while Han *wuzhu* continued to circulate. Occasional experimentation with token coinage failed as usual.⁹⁵ Stable coinage returned only temporarily under the early Tang dynasty with the introduction of the *kaiyuan tongbao* in 621 CE. At 10 coins per (Tang) *liang* (41g), it restored the Han tradition of issues that were based on a clearly defined weight standard. However, deprecatory pressures soon resumed: in 732 CE, a law had to re-impose the original 4.1g standard in the face of intervening weight loss. For the first time, the coin alloy was officially set at a fixed configuration with an 83.5 percent copper component (see below, section 8). In the following centuries, the weight and composition of coin issues continued to vary depending on the state of public finances and copper production.⁹⁶

⁸⁶ *Hou Hanshu* 87 in Peng 1994: 179; cf. 161 n.9.

⁸⁷ Peng 1994: 161 cites a contract from 184 CE referring to “a thousand cash lacking fifty.”

⁸⁸ Von Glahn 1996: 52, 70.

⁸⁹ Thierry 2003a: 62-4. During the terminal phase of the Han Dynasty, the central government reportedly melted down *wuzhu* coins and recast them into small cash coins of unknown face value. However, circulation was probably limited to the Luoyang area: Peng 1994: 162-4. Small cash was abolished in 208 CE.

⁹⁰ Thierry 2003a: 65.

⁹¹ *Ibid.* 69. Specimens have been found at various locations.

⁹² Peng 1994: 173.

⁹³ Thierry 2003: 65-6. Decline: Peng 1994: 171-3.

⁹⁴ Thierry 2003a: 71-3.

⁹⁵ *Ibid.* 92-3 (media), 94 (tokens).

⁹⁶ See Wang *et al.*, eds. 2005 for a broad overview.

4. Monetary uses of gold and silver in ancient China

4.1. Pre-imperial practices

All known tool coins and round coins were made of copper, bronze, or occasionally iron. Given the prevalence of precious metal coins in all other monetary systems of the ancient world, from Celtic Britain to Gupta India, this raises questions about the uses of gold and silver within the Chinese sphere of exchange.

In traditions about the past, gold occupies a prominent position. Sima Qian lumps together “tortoise and cowrie shells, gold and bronze coin, knife-shaped and spade-shaped money” as the means of exchange that were created as commerce developed.⁹⁷ The same line-up is featured in a debate set in 81 BCE where primordial barter arrangements are considered to have been replaced by the use of “tortoise and cowrie shells, gold, and bronze coins as the media of exchange.”⁹⁸ The *Guanzi* establishes a hierarchy of different types of money. Thus, the Zhou kings were thought to have “made pearls and jade their superior currency and gold their second currency, while knife-shaped and spade-shaped bronzes were relegated to the position of inferior currencies.”⁹⁹ While pearls and jade never served as money per se, they were certainly exchanged in the top echelons of society within an elite transactional order that excluded commoners (see below, section 7.3). It appears that both pearls and jade could even be imagined to be imbued with quasi-magical properties.¹⁰⁰ Gold, by contrast, was considered to be more widely available and used: “The five grains are the Sovereigns of Destiny to the people. Gold and knife-shaped specie serve as their common currency.”¹⁰¹ In numerous other passages, “gold and knife-shaped and spade-shaped specie” are referred to as “the common currency of the people.”¹⁰² In some contexts, gold could even be singled out as the anchor of the whole monetary system: “Gold is the standard of expenditures. The prince who discerns the fundamental laws of gold will understand the dangers of parsimony and prodigality.”¹⁰³ The context suggests that it was rulers (rather than ordinary money users) who appear to have viewed gold as the key standard for expenditures and that the value of gold fluctuated according to the ratio of the gold supply to the supply of (other) commodities,¹⁰⁴ one of several invocations of the quantity theory of money in the *Guanzi* tradition and beyond.¹⁰⁵

In the pre-imperial period, how were precious metals used in actual transactions? The “Treatise on Food and Money” in the *Hanshu* imagines that in the early Zhou period the state did not only issue round coins on the *zhu* standard – which is clearly wrong – but also circulated “actual gold” in units of one Zhou square inch (*c.*2.3cm²) and 1 *jin* (*c.*250g).¹⁰⁶ In this scenario, gold served as “the most precious medium of exchange” while “the most convenient one was the knife-money, [and] the one which flowed [like water from a spring] was coins.”¹⁰⁷ While there is

⁹⁷ *Shiji* 30: 1442.

⁹⁸ *Yantielun* in von Glahn 1996: 27.

⁹⁹ *Guanzi* 77 “Dishu,” 3.84.

¹⁰⁰ Peng 1994: 69.

¹⁰¹ *Guanzi* 73 “Guoxu,” 3: 66.

¹⁰² Von Glahn 1996: 31.

¹⁰³ *Guanzi* 4 “Shengma,” 1.18.

¹⁰⁴ Von Glahn 1996: 32.

¹⁰⁵ Von Glahn 1996: 33; see esp. *Guanzi* 74 “Shanguogi,” 3.71; also *Guanzi* 76 “Shanzhishu,” 3.81-2; plus the references in von Glahn 1996: 267 n.44. On monetary thinking in *Guanzi*, see also Hu 1988: 131-8.

¹⁰⁶ *Hanshu* 24B: 1a; Swann 1950: 220-1. It is difficult to determine the weight of the *jin* (or of its constituent unit, the *zhu*) with precision: modern scholarship variously reckons with a *zhu* of 0.64-0.66g and a *jin* of 244-256g. Compare Wang 2005: 287-91 for metrological analysis based on Chu, Qin and Han weights and bullion. In the following, I use *c.*250g as a rough approximation of 1 *jin*.

¹⁰⁷ *Hanshu* 24B: 1a.

currently no sign of these tiny gold ingots in the archaeological record,¹⁰⁸ the fact that the other denominations did in fact circulate in later periods raises the possibility that at least as far as *jin*-sized gold is concerned, this claim reflects conditions at a later stage, most likely in the Han period.¹⁰⁹

Gilded cowries and imitation cowries made entirely of gold have been unearthed at early sites.¹¹⁰ Given the monetary use of bronze cowries in the Zhou period (see above, section 2), we may wonder if these objects also served a monetary purpose, but nothing further is known. In addition, excavations have repeatedly yielded spade-shaped silver bars from as early as the Spring-and-Autumn Period.¹¹¹ Their function is unknown and they do not appear in the textual tradition.

Textual records pertaining to the Warring States period frequently mention certain numbers of *jin*, a term that can mean “gold” but also refers to other metals, and likewise to the gold value of other – i.e., bronze – denominations.¹¹² References to *huangjin*, or “yellow gold,” invite a literal reading as units of actual gold,¹¹³ but even in those cases the context sometimes suggests that this need not necessarily have been the intended meaning (see below). The value of a *jin* of gold relative to bronze coins or other commodities would fluctuate: according to the *Guanzi*, if grain prices stood at a certain level, the price of (1) *jin* was 4,000 (cash).¹¹⁴

Gold use is commonly situated in elite settings: “With but 40 *yi* [c.12.5kg] of gold, six pairs of white jade pendants, I dare not face Your Grace.”¹¹⁵ Rulers and other elite members could be portrayed as handing out gold.¹¹⁶ The *yi* (c.310g) often occurs as a unit of gold. Peng lists a large number of references, often associated with regal actions on an appropriately grand scale: the most commonly mentioned amounts are 1,000 *jin* or *yi* of gold (i.e., c.250-310kg) (16 times) and 100 *jin* or *yi* (i.e., c.25-31kg) (12 times); the highest ones 11,000 *jin* (i.e., c.2.75 tons) (once) and 10,000 *jin* or *yi* (i.e., c.2.5-3.1 tons) (4 times); tallies below 100 units are rare.¹¹⁷

Official salaries were usually paid in foodstuffs whereas gold was reserved for special gifts and rewards.¹¹⁸ If the literary tradition is to be trusted, governmental use of bronze cash appears to have been correspondingly rare: taxes were due (mostly) in grain and cloth and labor services rather than coin, and elite documents rarely mention coin, except with reference to merchants and small payments.¹¹⁹ We might speculate that in this context, (unminted) gold would stand out as a high-value prestige good reserved for large-scale state business, representing a socially elevated transactional sphere that may have been poorly integrated with the bronze currency system of the commoner population (see further below, section 7.3). This notion, however, is hard to reconcile with conventional assertions that gold as well as the various categories of bronze coins served as the “common currencies” of “the people” (see above).

¹⁰⁸ Thierry 2001b: 131.

¹⁰⁹ The imaginary Zhou gold squares may have been derived from the gold squares produced in Chu: see below.

¹¹⁰ Peng 1994: 69.

¹¹¹ Yao and Wang 2003: 22. However, 18 silver spades found in a village in Henan province may not date from the pre-imperial period at all, as they were mixed with items from the Warring States and early Han periods: Peng 2000: 169-70.

¹¹² Peng 1994: 70, and see below.

¹¹³ Swann 1950: 220 n.362.

¹¹⁴ Peng 1994: 70. See below, section 4.2.

¹¹⁵ *Dialogues of the States*, “Dialogues of Jin” 2, in Peng 1994: 71 n.16

¹¹⁶ References in Peng 1994: 70-71 nn.15, 17-8.

¹¹⁷ Peng 1994: 71-2 n.21.

¹¹⁸ Peng 1994: 87.

¹¹⁹ *Ibid.* See however Peng 2000:171-2 for the use of coins as tax payments alongside grain and cloth. Two passages in *Guanzi* merely recommended that state officials be paid in cash rather than in kind (*ibid.* 171). For evidence suggestive of coin use among peasants, see *ibid.* 173-5.

Unfortunately, evidence for the use of gold in non-elite contexts appears to be very rare in the textual record. One decidedly non-elite story is related in the *Liezi*: “Formerly there was a man of Qi who desired gold. One bright morning, he donned his clothes and hat and went to the market, where he encountered a gold-seller’s booth, from which he snatched some gold and fled. The clerk stopped him and asked: ‘Why did you snatch the gold with people standing all around?’ The man replied: ‘When I took the gold, I did not see the people, I only saw the gold.’”¹²⁰ That gold would have been available for sale is clear from its widespread use in the production of jewelry and ornaments.¹²¹ However, its monetary function at sub-elite levels remains unclear.

Information pertinent to this issue is limited to the southern state of Chu that provides the main exception to the bronze-based currency systems of the pre-imperial period.¹²² The local rivers were an important source of gold, and Chu enjoyed a reputation as a gold-rich region.¹²³ All gold bullion finds from the Warring States period originate from the territory of this state.¹²⁴ Gold was cast in large flat sheets stamped with a number of (ideally) rectangular seal marks; these rectangles could be broken off for separate use. Each rectangle bore an incised inscription with the term *yuan* (the name of the money) and the name of the current capital city of Chu (first Ying, then Cheng).¹²⁵ Individual sheets could consist of 16, 20, or 24 rectangles. Many surviving units are far from square or rectangular: corners or larger bits are missing, sometimes fragmented squares are joined together, and so forth. As a consequence, individual units must always have been weighed to determine their actual exchange value.¹²⁶ Peng lists the weights of 36 items, ranging from 4 incomplete squares weighing 66 grams to fragments as light as 4 grams. Twelve reasonably complete and regular squares range from 10 to 20 grams, with a mean of 15 grams. Individual squares in another sample of 35 items weigh between 12 and 17 grams.¹²⁷ This puts them somewhat above the usual weight of western gold coins, equivalent to 1.2-2.5 Augustan *aurei* or 2.2-4.5 Constantinian *solidi*, rendering them functionally equivalent to large gold coins.

The volume of gold rectangles in circulation is necessarily unknown. Even so, it is probably significant that specimens have been found across the Chu territory except in the south and mostly in hoards (reflecting their monetary function) rather than tombs. Moreover, over 100 excavated Chu tombs contain scales and exceptionally tiny weights that appear to have been designed for the weighing of gold.¹²⁸ All this suggests that this type of currency was not particularly rare: an observer from the Song period reports that “very many people” had found specimens in the soil and in rivers.¹²⁹ For these reasons, and given their moderate weight, these units may well have performed genuine monetary functions even beyond narrow elite circles.

Was this type of gold money an indigenous development? There are no known parallels in other parts of China, but similar items were also in use farther south, all the way to Vietnam. The closest parallel is provided by the square silver plates of northwestern India in the fourth

¹²⁰ *Liezi*, “On tallies” 8, in Peng 1994: 70 n.14

¹²¹ Cf. Andersson 1935.

¹²² Thierry 1997: 146-52; 2003b: 49-50. For the gold plates, see Ivotchkina 1993; Lu and Wu 1997; Peng 2000: 209-12. On Chu in general, cf. Blakeley 1985-87; Lawton 1991; Cook and Major 1999. For bronze plates, cf. Thierry 1997: 152-7.

¹²³ References in Peng 1994: 72-3 nn.23-5, and Peng 2000: 211-2. Cf. also Bunker 1993: 47 for gold finds in the adjacent southwestern kingdom of Dian.

¹²⁴ Peng 2000: 209. Ran 1997 concludes that gold and silver objects were relatively rare in the pre-Han period and mostly concentrated in Chu. For early finds of gold objects, see Bunker 1993: 29-35.

¹²⁵ Peng 1994: 73-4; Thierry 1997: 148; 2003b: 50. Issues commenced in the fifth century BCE.

¹²⁶ Peng 1994: 73-4.

¹²⁷ Peng 1994: 73-4 n.27. This weight range centers on the *liang* of 15.25g: see below, n.***. Peng 2000: 169 refers to a find of 170 specimens but no weights are given. Cf. also Thierry 1997: 147.

¹²⁸ Thierry 1997: 149-51 with map 10.

¹²⁹ Peng 1994: 73 n.26.

century BCE, which likewise bore seal marks and could be broken into pieces.¹³⁰ We would need to know more about the relative chronology of the Indian and Chu coinages to assess the probability of eastward diffusion. Chu gold plates continued to be hoarded (though not necessarily circulated) until the Eastern Han period.¹³¹ A possible parallel to Chu gold money may conceivably be provided by gold ornaments with inscribed weights found at Yanxiadu, the capital of the northeastern Yan state from 311 to 222 BCE.¹³² However, the monetary properties of these items remain unknown.

4.2. Gold and silver in the Qin-Han period

The first Qin emperor imposed a bimetallic system of gold and copper: “Actual gold which weighed a *yi* [20 *liang*, or c.310 grams] was given the name of “currency of the first class,” and while the copper coins were the same as the Zhou cash on the reverse surface, their inscription read *banliang*, and their weight accorded with the legend.”¹³³ However, while gold may have been measured in *yi*, there is currently no evidence of *yi*-sized standardized gold ingots or other forms of money: two gold ingots found in Shaanxi bear the legend “*yi*” but weigh 253.5 and 260 grams, broadly equivalent to the subsequent Han gold unit of 1 *jin* or c.250 grams.¹³⁴ The following observations that “pearls, jade, tortoise [shell], cowries, silver, and tin were used in or for vessels or ornaments, but they were not [used as] money,” and that “each of them according to demand and supply fluctuated [in price] from time to time, never being [of] constant [monetary value],”¹³⁵ might be taken to suggest that gold and copper did in fact possess fixed monetary value, which would imply that the two metals were to be exchanged at a fixed ratio as well. This is consistent with the fact that the Qin regulations on the Shuihudi bamboo strips from the mid-third century BCE stipulate that “if one pays and receives coins in terms of gold or cloth money, he must follow the official rates.”¹³⁶ It is unknown if this fixed rate was obeyed, if it remained stable over time, and especially if it survived into the Han period.

Under the Han, the unit of gold measurement was the *jin* (16 *liang* or c.250 grams). Finds from that period include rounded gold biscuits as well the so-called “horse-hoof” and “deer-hoof” pieces, the latter types having been introduced in the reign of emperor Wudi.¹³⁷ Recent surveys list 29 sites in 14 provinces across the country where a total of 1,047 Han gold ingots were found.¹³⁸ The two largest known hoards consist of 197 Han gold pieces discovered alongside 170 Chu gold plates and 18 silver spades at Gucheng village in Henan province in 1974 and of 219 Han pieces with a total weight of 54kg that were unearthed in the Chang’an area in 1999.¹³⁹ Only some of the Han gold ingots bore markings specifying their weight. A recent analysis of 54

¹³⁰ Göbl 1978: 111; cf. Peng 1994: 75.

¹³¹ Peng 2000: 210.

¹³² Bunker 1993: 45-6.

¹³³ *Hanshu* 24B: 3a.

¹³⁴ Li 1997: 52. Wang 2005: 274 refers to three different pre-Han gold pieces found at the Qin capital of Xianyang with weights from 249 to 265 grams. Hou 1996 argues that *yi* and *liang* had already been used as units of gold measurement in Chu. See also Wang 2005: 287-8, 294. If Qin had adopted Chu gold standards, this would further confirm Chu’s standing as the principal gold-user in this period (see above, section 4.1).

¹³⁵ *Hanshu* 24B: 3a.

¹³⁶ Peng 2000: 208.

¹³⁷ For discussions of the different shapes see Li 1997: 52-3 and Wang 2005: 267.

¹³⁸ Li 1997 (26 sites) and Wang 2005: 270-71 (3 more recent sites). 344 of them have been identified as “horse-hoof” and 90 as “deer-hoof” pieces, but not all the reports provide detailed classification. Even so, it is clear that biscuits dominate the record (Li 1997: 53).

¹³⁹ Zhu 1992: 168; Peng 2000: 169; Wang 2005: 270.

unmarked pieces yields an average weight of 251.2 grams, compared to a mean of 247.3 grams in the Chang'an sample of 219 (as yet unpublished) pieces.¹⁴⁰ These data strongly indicate that unmarked gold pieces were expected to conform to a uniform weight standard of 1 *jin*. This impression is reinforced by the fact that most unmarked pieces did not stray far from this target (Fig. 1).

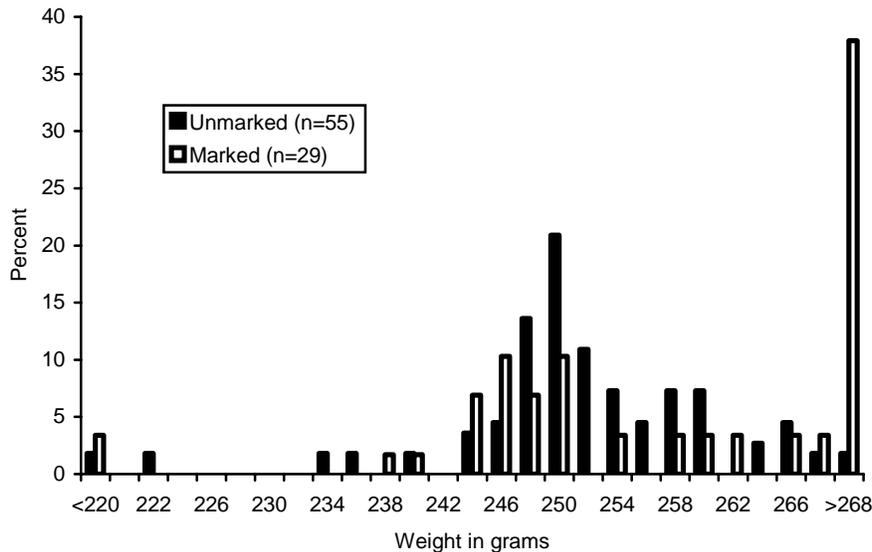


Figure 1 Weight distribution of marked and unmarked Han gold biscuits
Source: Wang 2005

By contrast, marked pieces did not fall into a similarly narrow range: only one-third of a smaller sample of 29 marked items range from 244 to 250 grams whereas almost half of them exceed 1 *jin* by anywhere from 6 to 85 per cent.¹⁴¹ This suggests that markings were applied primarily in order specify deviations from an otherwise normative weight standard. The notion of a *jin*-based weight standard is likewise consistent with the observed weight of a number of fractional pieces. Individual quarter pieces have weighed in at 60.9 grams (twice), 62 grams, 63.66 grams (the mean for 9 pieces), and 64.6 grams, thereby indicating a mean target weight of 252.7 grams for the underlying complete “deer-hoof” disks.¹⁴² Moreover, 29 small gold pieces found in the royal tomb at Mancheng average 15.1 grams or approximately one Han ounce (*liang*).¹⁴³ Fineness was consistently high: an analysis of more than 200 Han “deer-” and “horse-hoof” gold pieces found that most of them fell in a range from 97 to 99 per cent purity, with only a few outliers as low as 77 per cent.¹⁴⁴

The question of how the value of these objects was expressed in terms of the dominant bronze currency is very difficult to answer. In 9 CE, Wang Mang valued 1 *jin* of gold at 10,000 cash while 1 *liu* (c.125g) of particularly pure silver was valued at 1,580 cash and a *liu* of all other

¹⁴⁰ Wang 2005: 290-1 table 6. (I have excluded item no.43 which does in fact bear markings.)

¹⁴¹ Wang 2005: 282-3 table 3. The heaviest reported item weighed 462g.

¹⁴² Zhu 1992: 168-71. Cf. also Peng 1994: 144 n.68.

¹⁴³ Zhu 1992: 162-3 (Tomb II). 40 gold biscuits from Tomb I average 18g.

¹⁴⁴ Wang 2005: 273, summarizing Zhang 1985.

kinds silver was deemed worth 1,000 cash.¹⁴⁵ This passage raises several serious problems. First of all, it is not clear how these state-imposed ratios compared to actual market rates. Secondly, the implied gold/silver ratios of 5 to 1 for ordinary silver and $3\frac{1}{6}$ to 1 for high-grade silver appear very low by comparative standards.¹⁴⁶ And thirdly, we cannot even be sure what kind of cash is referred to. The common assumption that this passage somehow supports the notion of an exchange rate of 10,000 *wuzhu* coins for 1 *jin* of gold cannot readily be reconciled with the fact that Wang Mang's official valuation of gold and silver coincided with the demonetization of the Han *wuzhu* and its replacement by a 1-*zhu* coin valued at 1 cash in the same year.¹⁴⁷ The latter translates to an extraordinarily low gold/bronze ratio of 64 to 1 and silver/bronze ratios of 5-8 to 1 which mark out the new bronze issues as pure token coins.¹⁴⁸

Contrary to the tenor of modern scholarship, there is nothing to suggest that 1 *jin* of gold was either officially or de facto valued at 10,000 (*wuzhu*) cash at any time during the Han period.¹⁴⁹ In fact, there is no evidence to support the assumption that there was an officially determined exchange rate at all.¹⁵⁰ The available sources fail to create a coherent picture. A

¹⁴⁵ *Hanshu* 24B: 20b.

¹⁴⁶ Under the Northern Song, the gold/silver ratio stood at 6.25 to 1, similar to the putative 5 to 1 ratio 1,000 years earlier, but rose considerably in the course of the second millennium: to (perhaps) 8 to 1 around 1100; 13 to 1 by 1134, and 12-13 to 1 around 1200; then dropped back down to c.10 to 1 in the first half of the fourteenth century, followed by a reduction to between 4 and 6 (but mostly 5) to 1 in the late fourteenth and the first half of the fifteenth centuries; and gradually trended from about 7 to 1 in the late fifteenth century to about 13-14 to 1 in the late seventeenth century. See von Glahn 1996: 61. Chinese rates differ consistently from exchange rates in ancient western Eurasia: for gold/silver, 8-12 to 1 in late third century BCE Rome; 9.6-11.7 to 1 c.80 BCE; 8.6 to 1 in 50 BCE; 11.5 to 1 in the 40s BCE; and 11.75 to 1 under Augustus. The general impression that gold was cheaper and/or silver dearer in the East than in the West is corroborated by gold/silver ratios of 8.5 to 1 in Umayyad and early Abbasid Iraq and Syria, 6 to 1 in early thirteenth-century Iraq, and 6 to 1 in Abbayid Egypt (Ashtor 1976: 84, 257, 292), as well as 5-6 to 1 in medieval India and Malaya (Peng 1994: 208, 282). The relatively low value of gold in the early medieval Near East was a function of large imports from Nubia and especially the Senegal/Niger region, and its price soared as these inflows abated: Ashtor 1976: 80-1. Gold/silver ratios rose to 12 to 1 in late thirteenth-century Iraq and 13.4 to 1 in early Mamluk Egypt (*ibid.* 257, 292). This shows that the relative availability of bullion was the crucial variable.

¹⁴⁷ Modern observers tend to accept the valuation of 1 *jin* of gold at 10,000 cash as a customary and thus more generally "representative" rate (e.g., Swann 1950: 253 n.453; Dubs 1955: 510; Peng 1994: *passim*, but cf. 143, where he denies the existence of a stable exchange rate).

¹⁴⁸ Rightly emphasized by Li 1997: 55. For the relative valuation of gold and bronze, see below, section 8.

¹⁴⁹ Thus Peng 1994: 143 and Li 1997: 55. For a survey of documentary evidence from the Juyan garrison site, see Wang 2004: 52 table 8. The valuation of 4 *liang* of gold at 2,500 cash for the purpose of payment of a fine recorded on a bamboo strip from Juyan reflects a ratio of 10,000 cash per 1 *jin* but almost certainly dates from the Wang Mang period itself: Gansu sheng etc 1990: 337 (EPT 57:1; cf. the reign year in EPT 57:8). Two further texts report fines of 4 *liang* each (but without cash conversions) and two others refer to fines of 2,500 and 5,000 cash, respectively (but without corresponding gold valuations). In this context, the latter two references (Xie, Li and Shu 1987: 379 (231:115A, B) imply a conversion rate of 10,000 cash per *jin* but likewise appear to date from the Wang Mang period (cf. 231:106). A reference to 2 *liang* valued at "more than 1,000 cash" (Xie, Li and Shu 1987: 366 (227:13) dates from 44 BCE but is too unspecific to be of much help.

¹⁵⁰ I am unable to follow Swann's reasoning that the monetary reform of 14 CE that equated 5 *zhu* of bronze with 1 unit of cash (i.e., restoring the previous Han standard) "fixes, it seems [*sic*], the Han cash value of actual gold, of the weight of 244 g. or 7.84 oz. troy to have been 10,000 coins of the legal copper coins in use at the time of exchange" (Swann 1950: 351 n.726): there is nothing in the text to support this interpretation. Instead, the preceding text vaguely alludes to government orders "concerning [the use of] gold, silver, tortoise [shell], and cowries as media of exchange, to some extent increasing and decreasing former values." This passage seems to support the view that the exchange ratios imposed in 9 CE were to some extent arbitrary and may not in fact coincide with customary market rates. It is true that according to

valuation of 1 *jin* at 4,000 (cash) in the Warring States period may envision cash in the form of Qi knives (weighing 40-50 grams) or small spades of much lower weight, and cannot be applied to the Han currency. At first sight, several other textual references might be taken to suggest that a ratio of 1 to 10,000 approximates the right order of magnitude. The *Jiuzhang suanshu*, a mathematical exercise from the Western Han period, on one occasion puts the value of 1 *jin* of gold at 6,250 cash but in another problem equates 1 *jin* with 9,800 cash.¹⁵¹ In other examples, the same text prices heads of cattle at 1.619 *liang* of gold and at 1,200 and 1,818 cash; if the first amount were priced at 10,000 cash per *jin* or 625 cash per *liang*, it would equal 1,012 cash and therefore resemble the other two. The same is true for sheep prices, variously given as 0.952 *liang* (or 595 cash at 10,000 cash per *jin*) and from 150 to 500 cash.¹⁵² At the same time, however, these prices appear generally very low by contemporary standards: bamboo strips from the northern frontier dating from the first centuries BCE and CE convey the impression that an ox cost 2,500-3,500 cash and a sheep 900-1,000 cash.¹⁵³ Thus, we have to allow for the possibility that the *Jiuzhang suanshu* may preserve price levels of an earlier period when heavier bronze coin enjoyed greater purchasing power – in relation to livestock as well as bullion. This reading is consistent with the fact that four bamboo strips from the frontier suggest a much higher average gold price of about 20,900 cash per *jin*.¹⁵⁴ The discrepancy between this ratio and the much lower official ratio of 9 CE may arguably have been caused by Wang Mang's policy of promoting overvalued token coinage and discouraging private ownership of bullion through nominal depreciation.¹⁵⁵ Notwithstanding the introduction of normed gold pieces under emperor Wudi, there can be no doubt that gold was always valued according to its weight and not per unit.¹⁵⁶ Under these circumstances, an official gold price was not required to sustain that metal's monetary function: I am inclined to agree with Li Zude's assessment that this metal was valued like any other commodity and that its price floated in response to supply and demand.¹⁵⁷

Our understanding of the extent of gold use in the Han period suffers from persistent uncertainties regarding the actual meaning of the term *jin* in contemporaneous sources. *Jin* was repeatedly employed to denote wealth without necessarily referring to gold per se.¹⁵⁸ While some reports of imperial largesse mention *jin*, others speak of “yellow” *jin*, and although it is tempting to interpret the latter as references to transfers of certain amounts of actual bullion (rather than cash of equivalent value), it is troubling that in parallel accounts of the same gifts in the *Shiji* and

the *Hanshu* 99A: 10a, court officials claimed in 3 CE that according to “ancient practices, an empress was betrothed [with a gift of] 20,000 *jin* of actual gold, which would be 200 million cash” (Dubs 1955: 162). However, several other references to this custom merely mention 20,000 *jin* of gold: Dubs 1955: 162 n.9.9). This suggests that Ban Gu's aside may have been prompted by Wang Mang's subsequent gold tariffing.

¹⁵¹ *Jiuzhang suanshu* 6.15 and 7.5 in Vogel 1968: 63 and 72. The lower figure might conceivably refer to higher pre-wuzhu weight standards: at 12 *zhu* per cash, the gold/copper ratio would be 200 to 1; at 8 *zhu*, 134 to 1, i.e., essentially the same as the 131 to 1 ratio for 5-*zhu* cash.

¹⁵² *Jiuzhang suanshu* 8.7 in Vogel 1968: 84 (gold prices); 8.8, 8.11 (cattle) and 7.6, 8.8, 8.17 (sheep).

¹⁵³ Wang 2004: 63 table 17. Hsu 1980: 76 uses a valuation of 3,000 cash for an ox for his hypothetical model of a family farm in central Han China.

¹⁵⁴ Xie, Li and Zhu 1987: 604 (504:13, 81 BCE: 3.5 *liang* = 4,714 cash), 605 (505:20, 81 BCE: 58 *liang* = 79,714 cash), 609 (506:11, 12 BCE: 8 *liang* = 10,776 cash), 611 (506:27, 12 BCE: 1 *liang* = 1,327 cash, although in this case this equation is merely a conjecture). The overall mean is 1,369.23 per *liang* (and not 1,347 as stated by Li 1997: 56, which is however the precise valuation in two of these slips), equivalent to 21,908 per *jin*. None of these texts specifically mention “gold” but only that substance was sufficiently valuable to correspond to these cash amounts: see also Li 1997: 56.

¹⁵⁵ See above, section 3.3.

¹⁵⁶ Weight variation even among unmarked “deer-” and “horse-hoof” pieces was too large to allow their valuation “al marco”: cf. above, Fig. 1.

¹⁵⁷ Li 1997: 56.

¹⁵⁸ Peng 1994: 134 n.1.

the *Hanshu* one source sometimes refers to *jin* while the other specifies “yellow” *jin*. On a maximalist reading, these terms may have been considered interchangeable because – at least in certain contexts – both of them were thought to describe actual gold.¹⁵⁹ Conversely, a minimalist reading might suggest that cash value mattered more than the actual medium of exchange.¹⁶⁰ As it is, certainty is only possible in those cases where amounts of gold and cash are mentioned side by side as elements of the same transaction: for example, in 76 BCE, a vassal king was granted 200 *jin* of “yellow metal” and 20 million in coin.¹⁶¹

Transfers of *jin* – whether “yellow” or not – that may or may not refer to actual gold are frequently reported in elite contexts: foremost, for royal gifts to high-ranking recipients.¹⁶² Gold’s cachet may also be reflected in the marking “*shang*” (“higher”) that repeatedly appears on gold biscuits.¹⁶³ Government reserves partly consisted of gold (and silver), and gold was used in international transactions beyond the Han currency zone. Golden or gilded plaques with Chinese characters denoting their weight that have been excavated in Xiongnu territory may have been manufactured for use in trade with the northern nomads or as part of tribute payments.¹⁶⁴ A special tax, the “wine-toast for gold,” was imposed on aristocrats (see below). More mundanely, fines and bribes were often expressed (though not necessarily paid) in gold.¹⁶⁵

Peng tallies up all references to imperial grants of *jin* recorded in the *Hanshu* to arrive at a grand total of (at least) 900,000 *jin*, 90 percent of them disbursed in the long reign of Wudi.¹⁶⁶ This is consistent with the report that under this ruler, gold was cast in deer- and horse-hoof shapes, and distributed “among the vassal kings as grants to them.”¹⁶⁷ Unfortunately, it remains unclear how many of these transfers actually entailed gold: only 30 percent of all references explicitly mention “yellow” *jin*,¹⁶⁸ and as noted above, even these are not above suspicion. In theory, if all these payments had been made in gold, their cumulative weight would have amounted to 225 tons. Nevertheless, we need to allow for the possibility of a (much?) smaller actual total.

Unequivocal evidence for large bullion holdings is provided for the imperial treasury. In 23 CE, the inner apartments of Wang Mang’s Weiyang palace were said to contain sixty chests, each of which was filled with 10,000 *jin* of gold, whereas other offices housed “several” additional chests.¹⁶⁹ The veracity of this claim is hard to determine. Dubs, whilst conceding that “sixty” is a suspiciously round number and that some chests may not have been completely full,

¹⁵⁹ However, a maximalist reading needs to confront the problem of how the court acquired large quantities of actual gold to give away, given that we do not know of any taxes that were paid in gold except for the relatively small-scale “wine toast” tax (see below) and, perhaps, some fines (see above, n.***). Cf. already Li 1997: 58.

¹⁶⁰ *Hanshu* 99A: 9b, stating that when Wang Mang rejected 20,000 *jin* of gold (valued at 200 million cash) he was given 40 million cash instead does not mean, *contra* Peng 1994: 136, that “the term yellow metal is explicitly used here, but actual payment was made in copper cash,” since the two transactions are not the same.

¹⁶¹ *Hanshu* 7: 9b.

¹⁶² Peng 1994:135-8; Wang 2005: 294-95. Emperor Wudi observed that gold was “for bestowing favors on the various dukes and kings.” Li 1997: 59 notes that in Han literary texts, amounts of gold are commonly stated in a vague fashion, with a strong preference for stereotypical round numbers (such as 10, 100, 1,000 etc).

¹⁶³ Thus Li 1997: 54.

¹⁶⁴ Bunker 1993: 45, 47.

¹⁶⁵ References in Peng 1994: 134 nn.2-6. For fines in the Juyan documents, see above, n.***.

¹⁶⁶ Peng 1994: 135-6. According to the *Shiji*, the bulk of this expenditure was associated with two campaigns in Wudi’s reign in 123 and 119 BCE: Qi 1999b: 81.

¹⁶⁷ *Hanshu* 6: 35b.

¹⁶⁸ Peng 1994: 136.

¹⁶⁹ *Hanshu* 99C: 25a-b, with Dubs 1942.

defends the credibility of this passage.¹⁷⁰ Even discounting the contents of the “several” additional chests, 600,000 *jin* of gold amount to 150 tons, equivalent to 6 billion cash according to the conventional conversion ratio of this period and perhaps to twice that amount in market prices (see above). In specie, this quantity resembles total American gold exports to Spain from 1503 to 1660, of 180 tons,¹⁷¹ and (in weight) equals 19 million Augustan *aurei* worth 1.9 billion sesterces, more than the annual Roman imperial budget. It closely resembles the tally for the public gold reserve of the Eastern Roman empire in 527 CE, of 129 tons of (actual?) gold.¹⁷² In cash terms, this amount is not very different from the 8.3 billion in cash reserves reportedly held by the Han treasury in the 40s/30s BCE.¹⁷³ At the same time, it compares very favorably with the 20-30,000 *jin* of gold and 80-90,000 *jin* of silver held by the treasury in the late second century CE.¹⁷⁴ However, if a single vassal could be endowed with 7,000 *jin* (c.1.75 tons) of gold alongside 60 million in cash and 17,000 households,¹⁷⁵ the existence of much larger governmental gold stocks might well be regarded as credible. As usual, it is impossible to tell if the 200,000 “yellow” *jin* that the emperor Wudi had, from c.135 to 123 BCE, spent on rewarding his troops were in their entirety comprised of actual gold:¹⁷⁶ only in that case could this figure lend some measure of support to the tally for 23 CE. In short, the reported gold accumulation under Wang Mang appears extraordinarily – though not impossibly – large.¹⁷⁷

The “wine toast” tax instituted by the emperor Wendi (180-157 BCE) required fiefholders of a certain standing to submit, once a year, 4 *liang* (c.62g) of gold per 1,000 population under their control.¹⁷⁸ Given a fief population total of 6.38 million, this would amount to no more than 400kg of gold. (At this rate, it would have taken 375 years to accumulate Wang Mang’s gold stocks of 600,000 *jin*.) Even so, this tax was taken seriously enough to prompt the dismissal of officials who failed to surrender the correct amount.¹⁷⁹

Gold use in sub-elite settings may be inferred from the existence of relatively small gold ingots (see above). The Mancheng ingots of 6.2-21.5 grams equaled 0.4 to 1.4 *liang*. In one text, remission of a death sentence is priced at 2½ *jin*, equivalent to tens of thousands cash.¹⁸⁰ This must have exceeded the capacities of most commoners, as the wealth of a medial family could be set at 10 *jin*.¹⁸¹ Yet these figures also suggest that even individuals of moderate means could, however, on occasion make good use of small gold ingots of 0.025-0.0875 *jin*. It is true that, at 20,000 cash/*jin*, the value of any one of these specimens would exceed the Han poll tax of

¹⁷⁰ Dubs 1942: 36 n.2. I should add that due to the high specific weight of gold, 10,000 *jin* or 2.5 tons of this metal, cast in solid bars, would fit into a chest of moderate size (e.g., 80cm by 40cm by 40cm): this aspect of the tradition is not inherently incredible.

¹⁷¹ Dubs 1942: 38 n.6.

¹⁷² Harl 1996: 176: government stocks had risen from 32 tons in 450/57 CE to 103 tons by 518 CE and 129 tons in 527 CE. The values are expressed in *centenaria*, or units of 100 Roman pounds of gold. It is, however, uncertain, if all these treasures consisted of gold: in 468 CE, the same state covered one-third of the costs of a massive campaign by spending some 226 tons of silver (ibid.).

¹⁷³ Nishijima 1986: 593-4.

¹⁷⁴ *Hou Hanshu* 102 “Biography of Dong Zhuo,” in Peng 1994: 134 n.5. It also far exceeds the 1.2 million *liang* or 45 tons of gold reportedly captured by the Jurchen when they seized the Song capital of Kaifeng in 1127: see von Glahn 2004: 169 and n.20.

¹⁷⁵ Nishijima 1986: 593.

¹⁷⁶ *Shiji* 30.11; Dubs 1942: 37.

¹⁷⁷ If this tradition is genuine or at any rate not wide off the mark, the gold withdrawal scheme of 7 CE must have met with considerable success (see above).

¹⁷⁸ Thus Nishijima 1986: 592-3. According to Peng 1994: 134 n.2, the *Hou Hanshu* “Monograph on Ceremonials” holds that lords of fiefs from 500 to 1,000 people were liable to the same payments.

¹⁷⁹ Peng 1994: 134 n.2 for references.

¹⁸⁰ *Hanshu* 44, “Biographies of the Kings of Huainan, Hengshan, and Jipei,” in Peng 1994: 137.

¹⁸¹ Swann 1950: 384. This estimate is of course highly uncertain.

between 80 and 120 cash for adults aged 15 to 60¹⁸² by anywhere from 300 to 2,100 percent. Yet the margins are such that gold use need not have been completely out of reach for rare big-ticket transactions. If higher reported tax rates for merchants are anything to go by,¹⁸³ members of that profession would have more frequently been involved in “gold-sized” transactions. Whether gold was in fact regularly exchanged in such contexts remains of course an open question. The archaeological record merely suggests that this cannot have been completely unheard of. In sub-elite circles, gold may have been used primarily as a means of storing wealth. In the event of a crisis, “the common people” were seen “selling gold, silver, pearls, jade, and precious objects.”¹⁸⁴ Moreover, gold may not have been directly usable for purchases: in a story about the Eastern Han period, a “poor and sickly scholar” carries 10 *jin* of gold under his belt, one of which then gets sold to meet the expenses for his funeral.¹⁸⁵ On the other hand, one of the mathematical exercises in the *Jiuzhang suanshu* gives prices in *liang* of gold for two groups of seven cattle and sheep each, whereas cash is consistently used in a large number of other cases: each head of cattle is valued at 1.619 *liang* (or *c.*25g), and one sheep costs 0.952 *liang* (or *c.*14g).¹⁸⁶ Given the persistently down-to-earth character of the contexts provided for the mathematical problems, this scenario may well have been considered plausible: at the very least, there is no indication that the use of small units of measurement such as *liang* ounces served some specific mathematical purpose.¹⁸⁷ One of the exercises mentioned above envisions a group of 33 men who pool their resources to buy gold. Another one talks about “a man carrying 12 *jin* of gold beyond the frontier. The frontier tax is one part in ten. Now at the frontier two *jin* of gold are taken, and change of 5,000 cash is given in return.”¹⁸⁸ In all these cases, gold use is located in non-aristocratic contexts, and bullion is portrayed as a commodity to be purchased with or exchanged for bronze cash.

According to Peng’s survey,¹⁸⁹ the sources for the Eastern Han convey the impression that far fewer imperial gifts were made in gold than during the first half of the Han period. Thus, the *Hou Hanshu* records a total of 21,740 *jin* (or 5.4 tons) of (putative) gold, compared to over 40 times as much in the Western Han period. However, looked at more closely, this difference is almost entirely a function of the absence of very large grants in the later centuries: almost eight-ninths of the much larger Western Han tally is made up of three huge donations. The relative distribution of gold (or “gold”) gifts remained the same: we hear of 85+ gifts of 2 to 1,000 *jin* and 13 gifts in excess of 1,000 *jin* in the first period and of 8+ gifts of 10-1,000 *jin* and just one in excess of 1,000 *jin* in the second. At the same time, the overall incidence of records differed dramatically: 9 gold gifts and 64 cash gifts in the second period compare poorly with *c.*100 gold gifts and *c.*50 cash gifts in the first one. We are left wondering if this shift signifies mere literary fashion (that gave greater prominence to cash valuations as opposed to the earlier – *perhaps* – often nominal gold valuations) or whether it reflects genuine changes in money use at the imperial court.

¹⁸² Nishijima 1986: 598.

¹⁸³ Nishijima 1986: 599.

¹⁸⁴ *Record of the Three Kingdoms* 5, in Peng 1994: 135 n.7.

¹⁸⁵ *Hou Hanshu* 111, in Peng 1994: 135 n.7.

¹⁸⁶ *Jiuzhang suanshu* 8.7, in Vogel 1968: 84. Priced in cash at around 10,000 per *jin* (but see also in the text above), the corresponding valuations of 1,012 and 595 would be broadly consistent with analogous prices in other problems: cattle are variously priced from 1,200 to 1,818 (*Jiuzhang suanshu* 8.8, 8.11) and sheep from 150 to 500 (*ibid.* 7.6, 8.8, 8.17). It merits notice that commodity prices vary considerably between different problems but always fluctuate within a particular range that may have appeared plausible. Stated price ratios, e.g. between different kinds of farm animals, also seem to aim for verisimilitude.

¹⁸⁷ Cf. *Jiuzhang suanshu* 8.8 for a very similar problem with the same animals and cash prices.

¹⁸⁸ *Ibid.* 7.5 and 6.3, in Vogel 1968: 72, 63.

¹⁸⁹ Peng 1994: 137-8.

Later Chinese sources marveled at the supposed abundance of gold in the (Western) Han period that contrasted with later scarcity.¹⁹⁰ A Tang commentary on the *Hanshu* noted that “nowadays people frequently get “horse-hoof” gold from the earth. The gold is extremely pure, and artfully shaped.” Plowing could turn up an entire jar full of these precious objects.¹⁹¹ Various explanations for the late and post-Han decline in gold use have been mooted, such as the immobilization of bullion in gilded Buddha statues following the spread of Buddhism; the appropriation of gold stocks under Wang Mang and its subsequent retention by the restored Han clan;¹⁹² and the outflow of specie to Central Asia, in order to pay off hostile neighbors and to acquire horses and other imports.¹⁹³ Increased use of gold for ornamentation is another candidate: while court society (both in the center and among the vassal rulers) had always absorbed considerable quantities of gold for adornment,¹⁹⁴ in the Eastern Han period, gold (and silver) objects became much more common in graves than they had been in previous centuries, a trend that further strengthened during the Jin period.¹⁹⁵ At the end of the Han period, the plundering of a single princely tumulus tomb allegedly yielded tens of thousands of *jin* of gold.

Concurrently with the apparent decline of the monetary use of gold in the Eastern Han period, silver assumed greater significance in the sources. Following Wudi’s short-lived experiment with “White Metal” coinage (see above, section 3.2), Wang Mang was the first officially to recognize silver (measured in half-*jin* units called *liu* and graded according to purity) as a monetary means of exchange, a reversal of Qin Shihuangdi’s regulation that silver was not be used in that capacity (see above). From the first century CE onwards, references to stocks and grants of silver measured in *jin* appear in the record: in 111 CE, a group of Qiang was rewarded with 100 *jin* of gold and 200 *jin* of silver; and as already mentioned above, in the late second century CE, Dong Zhuo hoarded 20-30,000 *jin* of gold and 80-90,000 *jin* of silver.¹⁹⁶ Rectangular and boat-shaped silver ingots have occasionally come to light: Peng cites four inscribed specimens weighing 125, 205, 356, and 403 grams that date from the years 57 and 148 CE.¹⁹⁷ After a protracted hiatus, these items resumed the tradition of casting silver ingots that is first documented for the Spring-and-Autumn Period (see above, section 4.1).

Monetary use of gold and silver greatly increased under the Western Jin. Gold may well have increased in value relative to copper, and prices began to be expressed in silver. Coin-shaped gold and silver entered circulation, as did cakes and ingots.¹⁹⁸ The restorationist Tang regime returned to cash pricing. Gold and silver were used largely as a store of value while silver ingots were increasingly employed in international transactions.¹⁹⁹

¹⁹⁰ Peng 1994: 135 n.9 for references.

¹⁹¹ Peng 1994: 144 nn.69-70.

¹⁹² The younger brother of the empress of Guangwudi, the first emperor of the restored Han Dynasty (25-57 CE), reportedly “accumulated gold to the amount of several hundred million, had over four hundred servants, and used gold for utensils. The sounds of his smelters resounded in the capital suburbs,” and “was granted gold, coin, fine and ordinary silks in incomparable abundance” (Wang Jia, *Record of Anecdotes Missed by History* 6, and *Hou Hanshu*, “Annals of Empress Guo,” in Peng 1994: 141 n.53).

¹⁹³ Peng 1994: 138-41.

¹⁹⁴ Peng 1994: 142-3 n.59.

¹⁹⁵ Peng 1994: 143. On late Han money-trees, see Erickson 1994.

¹⁹⁶ Peng 1994: 145.

¹⁹⁷ Peng 1994: 145-6.

¹⁹⁸ Peng 1994: 203 (but see below, n.***), 206. The production of normed silver ingots commenced in the Sui period: Bunker 1994: 73.

¹⁹⁹ Peng 1994: 276-8.

5. Patterns of monetary development in ancient China

It is possible to distinguish between four principal stages in the monetary history of ancient China. In Phase 1 (from very roughly 1000 to c.220 BCE), individual polities – or private individuals within them – supplemented and gradually replaced cowries by casting bronze money in the form of miniaturized tools and (from the fourth century BCE) also in the form of round coins. While the most urbanized states in the central Great Plain used both their own issues and those from neighboring states, more peripheral polities developed closed and putatively state-controlled currency systems. The southern state of Chu followed a separate trajectory, combining bronze imitation cowries with small punch-marked gold plates. In the other states, gold and silver reportedly circulated as bullion but remain rare in the archaeological record. The two distinctive Chu currencies were discontinued upon conquest by Qin and no further coin-sized gold units were issued in the unified empire. In Phase 2 (c.220-112 BCE), the imperial center formally imposed a bronze currency comprised of coins of varying (but gradually lowered) weight standards. Periods of (nominal) state monopoly on coining alternated with those in which private individuals were permitted to contribute to the money supply. Gold circulated in the form of bullion but officially counted as money. In Phase 3 (112 BCE – c.170 CE), the imperial government upheld a state monopoly on coin production and for most of the time maintained a single fixed weight standard. Experimentation with token money between 7 and 14 CE proved short-lived and unsuccessful. Gold bullion may increasingly have circulated in the form of standardized ingots. In the first and second centuries CE, silver bullion may have increased in importance relative to gold, but the evidence is ambiguous. Phase 4 (c.170-c.250 CE) witnessed the partial collapse of the standardized bronze coin currency and inflationary debasement, followed by a prolonged slump in coin production and reliance on existing issues in combination with payments in kind, most notably in the fourth and fifth centuries CE.

6. Patterns of monetary development in the Roman empire

6.1. From bronze to silver to gold²⁰⁰

The monetary systems of ancient Italy and ancient China shared a feature that was lacking from other historical societies: when coinage appeared for the first time, it was manufactured of cast bronze. In Italy, unlike in China, Romans, Etruscans and Samnites issued relatively large and heavy bronze denominations, functionally equivalent to the small metal bars that had previously been in use (such as *aes rude* in Rome and “ramo secco” copper bars in Etruria). The earliest Roman coins were cast on the libral weight standard (1 *as* at c.323g), with 1 *uncia* (one-twelfth of an *as*, or 27g) providing the smallest fractional issue. Other Italian polities employed different standards: c.200g in Etruria and Umbria, c.350-400g in Ariminum and Hatria. As in Eastern Zhou, Qin, and early Han China, debasement was achieved by reducing weight standards, a process that was primarily driven by fiscal exigencies caused by military pressure: during the First Punic War (264-241 BCE), the intrinsic value of the *as* was lowered by one-sixth to 10 *unciae* whilst retaining its nominal value. Debasement accelerated greatly during the Second Punic War (218-202 BCE): between 218 and 213 BCE, target weights for an *as* dropped from 268g to 133g to 83g to 69g to 40.5g, reducing the (putative) metal value to one-eighth of the original standard. In the later years of the war, the uncial standard became the norm (1 “*as*” =

²⁰⁰ The following survey is primarily based on Harl 1996: 21-206 which despite its strongly “metallistic” perspective (see below, section 8) and various inadequacies provides a convenient summary of existing scholarship.

27g, or one-twelfth of the original weight). These smaller coins came to be issued in large quantities during the first half of the second century BCE.

In contrast to China, however, the Roman-Italian monetary system was embedded in a much larger and older international currency system based on coined silver. As a result of intensifying military engagement with this sphere, the Roman state gradually adopted a bimetallic system that paired traditional bronze with “Greek-style” silver: from the late fourth century BCE onwards, the Campanian stater (falling, between c.310 and 240 BCE, from 7.3 to 6.6g gross and from 6.8 to 6.4g silver weight) was used alongside the *as* and its fractions. The subsequent silver *quadrigatus/denarius* was debased in the opening years of the Second Punic War (from 6.4 to 6g silver, or from 97 to 91 percent fineness), and around 216/14 BCE the state cast bronze *multipla* (such as the 10-*as decussis*) to mitigate the war-induced scarcity of silver. Silver coinage survived in the form of the devalued *denarius* of c.213/12 BCE, minted at 1/72 pound (c.4.5g) at 96 percent fineness. In the final years of the war, standards continued to slide, from c.1/72 to c.1/76-80 pound per *denarius*. In 187 BCE, the *denarius* was re-set at 1/84 pound (3.85g) but – thanks to continuing Roman successes and improved access to mines – remained stable for the following 250 years.

Although large numbers of bronze coins were turned out in the first half of the second century BCE, production does not appear to have kept up with rising demand caused by the gradual monetization of the Roman economy: silver *denarii* were often cut in half or quarters to compensate for the scarcity of fractional coinage. It did not help that the Italian allies cast *asses* at different standards (at 18 to 32 to the Roman pound) and that Roman bronze coining was sharply curtailed in the second half of the second century BCE. As a result, older *asses* continued to circulate in an increasingly worn state, often losing as much as a third of their original weight. Moneychangers discounted these underweight *asses* and silver/bronze exchange rates fluctuated accordingly. In 141 BCE, the *denarius* was re-tariffed at 16 *asses*. Instead of *as* coins, the state produced mostly smaller fractional denominations (*semis*, *triens*, *quadrans*).

Gold had been temporarily coined during the emergency of the Second Punic War (a process paralleled by short-lived gold issues in Athens in the final years of the Peloponnesian War, or at Syracuse during the Athenian invasion). In the second century BCE, Macedonian gold coins captured in the wars of 200/197 and 171/67 BCE circulated in significant numbers (perhaps in sealed bags). Large purchases were settled in ingots of gold and silver, cast in multiples of the pound and certified by official stamps.

Thanks to state’s access to large quantities of silver, the weight of the silver *denarius* remained stable while its fineness fluctuated only mildly even in times of crisis: from 97.5 percent at the beginning of the first century BCE to 95 percent during the Social War (91-89 BCE), back to 96 percent by the mid-80s and 98 percent in the late 80s; down to 95-96 percent at the beginning of civil war in 49 BCE and again in 44/42 BCE. During the second triumviral period, Octavian’s issues in the West exhibited low fineness of 95 percent down to 36 BCE, thereafter improving to 97 percent, whereas Antony started out with 98.5 percent in the East in 41-38 BCE but eventually debased to 92 percent. As a consequence, Antony’s later issues, struck in large quantities, continued to circulate for generations in keeping with “Gresham’s Law” that bad money drives out good.

Gold coins re-appeared under Sulla’s dictatorship (struck at 30 to the pound) to provide donatives to the military, and again in 49 BCE. The gold/silver ratio had been as low as 8 to 1 during the 210s BCE but as silver inflows increased these coins were melted down to take advantage of a market ratio of closer to 10-12 to 1. By 50 BCE, Caesar’s conquests in Gaul had lowered the market price of gold to 750 *denarii* per pound, for an 8.6 to 1 ratio. The nominal standard for gold and silver coins set in 46 BCE was 1 *aureus* = 25 *denarii*, or 1 pound of gold = 1,000 *denarii*, for a gold/silver ratio of 11.5 to 1. Under Augustus, the *aureus* was issued in virtually pure gold at 40 to the pound whereas the *denarius* continued to be struck at 1/84 pound, its silver content restored to 97.5-98 percent. Pent-up demand for fractional coinage was met by

the brass *sestertius* (valued at $\frac{1}{4}$ *denarius* or 4 *asses*) accompanied by the copper *as*, *semis* ($\frac{1}{2}$ *as*), and *quadrans* ($\frac{1}{4}$ *as*).

Roman expansion precipitated progressive unification of the Mediterranean monetary system(s). In the west, local coinages gradually disappeared from the market: Greek and Punic gold and silver on Sicily and Sardinia by the 210s BCE; Celtic gold in northern Italy by c.200 BCE; all Carthaginian coins by 146 BCE; Iberian coins in the first century BCE; precious metal coins in Gaul in the 50s BCE, and later hybrids by the 10s BCE; Celtic coins in Britain in the first century CE. In the east, increasing quantities of gold and silver coins issued by the Hellenistic kingdoms were absorbed by the Roman state and transferred to Italy for re-coining. From 189 to 176 BCE, for instance, Rome received c.370 tons of silver coins as war reparations from the Seleucid empire, enough to mint 100 million *denarii* (and to undermine the Seleucid silver currency). In the Aegean, the Attalid *cistophori* silver coins continued to be minted under Roman rule, and various generals would on occasion produce tetradrachms. Unprecedented depredations under Sulla and in the second triumviral period caused the demise of many local (urban) silver currencies and the suspension or debasement of surviving coinages. By the time Augustus restored the *cistophorus* in Asia Minor and the Syrian tetradrachm, Roman *denarii* had already made major inroads into the monetary sphere of the Hellenistic East, as documented by hoards of the period.

The huge drain on eastern bullion encouraged a shift to local bronze issues, now pegged to the Roman *denarius*. Continuing local bronze coin production guaranteed the availability of small-denomination units that were vital to market transactions in traditionally monetized communities. In the west, by contrast, most communities had ceased production of local bronzes by the 30s CE. It appears that centralized production of the Roman mint (first in Lugudunum [Lyons], then in Rome itself) was capable of providing the (arguably significantly less monetized) western half of the empire with at least somewhat adequate amounts of small-denomination coins.

As a result of monetary unification, the central government increasingly gained the ability to control and manipulate weight and purity standards across its far-flung realm, either directly through imperial issues or indirectly via local systems that were formally or de facto pegged to the central currency system. Thus, once the center decided on debasement, local issuers had to follow suit to maintain circulation. From the mid-first century CE onwards, the imperial silver coinage underwent a gradually accelerating process of debasement and concurrent nominal overvaluation. Gold and base metal denominations were also affected to varying degrees. In 64 CE Nero reduced the weight of the *aureus* to $\frac{1}{45}$ of a pound (from $\frac{1}{40}$) and that of the *denarius* to $\frac{1}{96}$ pound (from $\frac{1}{84}$) while the latter's fineness dropped from 98 to 93 percent. Debasement of the silver standard proceeded in fits and starts, usually driven by military requirements: down to 80-89 percent under the early Flavians; restored to 98.5 percent in 82 CE but down to 93 percent in the following years; down to 89-90 percent under Trajan (98-177 CE); and on to 83-84 percent under Antoninus Pius (by 148 CE) and to less than 80 per cent by 161 CE. Base metal coins likewise experienced significant debasement in the course of the second century CE; the *semis* and *quadrans* formats were discontinued; overall output was reduced; and the *sestertius* began to be made of (cheaper) bronze instead of brass and adulterated with lead.

Provincial currencies were debased or re-tariffed accordingly. At the same time, a record number of cities produced bronze coins, rising from c.150 under Augustus to c.375 by 200 CE. Often consolidated in major workshops, output was huge: some 900 countermarks on civic base metal issues are known. In Egypt, traditionally a separate currency zone, the local silver tetradrachm was gradually debased, from 3g of silver or 23 percent fineness under Claudius to 2.2g of silver or 16-17 percent fineness in 58 CE, when existing issues were re-coined in vast numbers. Local drachms (nominally silver coins) were now issued as bronze coins.

Debasement of the imperial silver currency picked up from the 160s to the 230s CE, with a drop in fineness from c.80 percent to c.50 percent, or from 2.7g to 1.5g of silver (while gross weight remained largely stable). Again, this development was driven by rising military

expenditure, increasingly due to growing internal instability. An experiment in fiduciary silver money failed: a “double” *denarius (antoninianus)*, at 1.5 times the weight of the *denarius* but twice its face value, was introduced in 215 CE but merely prompted hoarding of single *denarii* of higher intrinsic value and had to be abolished a few years later. In 213 CE, the *aureus* was re-set at 1/50 pound (down from 1/45). Military events necessitated the return of the *antoninianus* in 238 CE, now even more debased, and as a result the (now intrinsically overvalued) *denarius* soon disappeared from circulation. During the following period of foreign invasions and temporary internal fragmentation, debasement soon reached dramatic levels. Between 238 and 269 CE, the gross weight of the *antoninianus* double *denarius* was halved while its fineness fell from about 50 percent to 1.7 percent, or from 2.4g to 0.1g of silver. At that stage, the empire had de facto switched to a bimetallic system based on gold and bronze, especially as users began to extract the thin silver veneer of the new nominal silver coins to sell as bullion. The number of mints kept increasing to raise output in the face of accelerating inflation. The *aureus* also fell in weight, yet to a much lesser extent than silver: from 1/50 to 1/52-54 (235/8 CE) to 1/65 (238/44 CE) to 1/90 (by 250 CE). In the 250s and 260s, putative multiples of reduced fineness (commonly 93-95 percent, but as low as 80 percent) were issued. By 269 CE, however, standards had been restored to 1/60 pound and 99 percent fineness.

As the silver currency turned into de facto bronze coinage, the nominal bronze fractions had to be debased further, first through weight reductions (in the 230s/240s CE) and then through adulteration with lead (at c.20-25 percent). Increasingly poorly manufactured pieces were churned out in large quantities, and, from the 250s CE onward, large denominations were hoarded as a hedge against silver inflation. This is consistent with a de facto switch to a bronze standard and indicates that coins were ultimately valued due to their metal value. By the 270s CE, de iure bronze coins had become too expensive to manufacture (compared to largely bronze “silver” coins of higher face value) and production ceased for about a century.

The civic coinages in the provinces were caught in a race to the bottom, suffering debasement in keeping with the trends set by the imperial mints. Heavily debased silver issues finally ceased in the 250s CE. Production of bronze coins crashed in the late 250s and 260s CE due to competition with radically debased imperial “silver” coins and resultant inflation. In the 260s CE, most local mints were abandoned. In Egypt, by 274 CE, greatly debased billon tetradrachms had driven out all local bronze coins.

Following imperial re-unification, Aurelian introduced a feebly improved “radiate” *aurelianus* of 3.9 gross weight and 4.5-5 percent fineness (i.e., c.0.2g of silver), tariffed at 5 *denarii communes* or 20 *sestertii*, both of them now reduced to mere units of account. The *aureus*, officially set at 1/50 pound but also struck at 1/70-72, was valued at 100-120 *aureliani*. This system remained in place for the next twenty years. Just as before, it was de facto anchored in gold coins that traded against billon (i.e., heavily adulterated silver) coins that were mostly bronze.

A reform in 293 CE aimed to restore a functioning silver currency. The weight of the *aureus* was raised from 1/70 to 1/60 pound, and gold was to be accompanied by a new pure silver coin (*argenteus*) struck at 1/96 pound (the Neronian rate), and valued at 25 *denarii communes* (as unit of account). A silver-wash billon coin was valued at 5 *denarii communes*, and a bronze coin at 1 *denarius communis*. This reform was shored up by massive recalls and re-minting, but failed immediately – and predictably – as the nominally hugely overvalued billon coin rapidly lost real exchange value. Two re-tariffings (from 600 to 1,200 and then 2,400 *denarii communes* for the *aureus*, and from 25 to 50 to 100 *denarii communes* for the *argenteus*) failed to keep pace with the collapse of the billon coin or *nummus*: once again, fiduciary coinage had proven unworkable, and market valuations according to metal content persisted. In response to the hoarding or re-melting of pure silver coins, the imperial mints ceased production of the *argenteus* soon after 305 CE while the billon coins continued to circulate at much discounted rates until the 360s CE. Constantine adjusted the gold “anchor” by switching to the gold *solidus* struck at 1/72 to the

pound and at 99.5 percent fineness. Silver continued to be invested into ever-increasing numbers of billon coins that went through several cycles of debasement and re-tariffing of the multiples that subsequently continued this process. From 303 to 348 BCE, the silver content of the billon *nummus* dropped from 1/32 pound to 1/196 pound, or from 10.75g to 1.65 of silver, and from 4 percent to 0.4 percent fineness. Price inflation progressed accordingly: between 323 and 445 CE, the value of the *solidus* rose from 6,000 *denarii communes* to up to 42 million, or from 240 to 7,000-7,200 actual billon *nummi*.

In 367 CE production of billon coins finally ceased, only to be replaced, *de iure*, by another pure silver coin that underwent heavy debasement and devaluation in the late fourth century, and to be continued, *de facto*, by various denominations of bronze coins, among which the *centenionalis* (2.45g) became the most important. Developments in the fifth century CE further reinforced the gold-bronze currency system that had emerged in the second half of the third century CE. Despite ongoing losses of bullion to foreign powers, gold expanded its dominance as the only reliable value standard. Gold circulated in *solidus* coins, packed into leather sacks of 100 pounds (*centenarium*) for larger transactions. Despite outflows, the treasury of the eastern empire reportedly managed to amass large quantities of gold: 32 tons by 457 CE, 103 tons by 518 CE, and 129 tons by 527 CE.

By the mid-fifth century CE, (coined) silver had largely dropped out of circulation. A massive *ad hoc* emission of over 100 million pure silver coins in 468 CE remained a one-off emergency measure. Two currency tiers survived: the gold *solidus* and *tremissis* at the top, and low-value bronze *nummi minimi* at the bottom. The latter continued to be devalued as they were adulterated with lead. Weight reductions were insufficient to keep the weight of bronze coins valued at 1 *solidus* under 25 pounds (8kg), and repeated re-tariffing was required. By 498 CE, one *solidus* traded for 16,800 *nummi*, instead of 7,000-7,200 as decreed in 445 CE. A text from Egypt from around 440 CE describes how a group of taxpayers met their obligations by handing over 1,522,080 bronze coins weighing 1,705 kg and equivalent in value to 211.4 *solidi* (which would have weighed 0.95kg, or about 1,800 times less). Owing to poor production standards, *nummi* were readily counterfeited and commonly appear in hoards of the fifth century CE. This shows that despite their low intrinsic value, these coins were nevertheless considered sufficiently valuable to be forged out of even cheaper materials than those employed by the authorities, and likewise valuable enough to be hoarded as a store of wealth. This chimes well with the ancient Chinese practice of counterfeiting low-value bronze coins despite comparatively tiny profit margins and the ability of low-value bronze coins to sustain an extensive monetary economy (see below, section 9).

In 498 CE, small bronze coins were recoined into bronze multiples (*folles*), at 8.5g, with the *nummia* serving as the base standard. The exchange rate was set at 1 *solidus* = 420 *folles* = 16,800 *nummiae*, for a real gold/bronze ratio of 800 to 1 (4.45g gold = 3,570g bronze). In 512 CE, both the weight and the nominal value of the *follis* were doubled. Due to renewed crises, a further upgrade to 22g (at 180 *folles* per *solidus*) in 538/9 CE could not be sustained: by the end of the seventh century CE, the weight of the *follis* had dropped to 3.5g, and its value to 1/950 of the *solidus* (roughly maintaining the existing gold/bronze ratio). The disastrous wars of the seventh century CE spawned huge quantities of various denominations of debased *folles* and chaotic exchange rates that once again wrecked the base metal element of the imperial currency system.

6.2. General trends

Well into the third century BCE, monetary practices in Italy developed at the margins of an expanding international system that originated in the silver coinages of the sixth-century BCE Aegean. Greek silver money spread along the main axes of Greek overseas migration, including

the western settlements in Sicily (by the mid-sixth century BCE), southern Italy, and the coast of Spain and Provence. From the late sixth century BCE, non-Greek populations in the northern Aegean imitated the Greek format. At the end of the fifth century BCE, Carthage adopted silver coinage in direct consequence of its intensifying engagement with the western Greeks. In the last third of the third century BCE, the conquests of Alexander the Great led to the replication of Greek minting practices all across the former Achaemenid empire. Northwestern India, which had previously begun to develop an indigenous tradition of square silver coins, also followed suit, and successive waves of foreign dynasties (Greco-Indian, Sakas, Pahlavas, Kusan) extended Greek-style money use across large parts of the Indian subcontinent, and into Central Asia to the north.

Initially, in the archaic and early classical Greek world, low-value coins were invariably made of silver, down to impracticably miniscule weights and apparently in very large quantities.²⁰¹ Fractional bronze emerged only belatedly, from the late fifth century BCE onwards, as increasing levels of monetization raised demand for low-value media of exchange beyond levels that could be satisfied by very small silver issues. Before the Roman period, widespread bronze use was confined in the first instance to the closed currency system of Ptolemaic Egypt. This puts the original Italian currency system in a genuinely unique position within western Eurasia.

About a century after Carthage had been drawn into the “Aegean” currency universe,²⁰² Rome followed suit with its Campanian series of silver staters. The shocks of the Second Punic War and subsequent inflows of silver from the Iberian mines and the Hellenistic kingdoms transformed the original bronze-based system into a bimetallic silver-bronze system that soon came to be anchored in silver. On one estimate, in the second century BCE, Roman bronze coins accounted for at least half of the amount of coin in circulation but only 10-15 percent of its overall value.²⁰³ Full monetary unification was a protracted process: significant steps included the absorption and re-coining of much eastern silver in the first century BCE, and the concurrent demise of local coinages in the western regions; massive injections of coined gold from the mid-first century BCE onwards that created a uniform empire-wide gold standard; the destruction of provincial coinages in the eastern provinces in the mid-third century CE; and repeated re-minting programs and standardized empire-wide re-issues of new formats from c.300 CE onward.

Very broadly speaking, the Roman monetary system evolved in six principal phases. In Phase 1 (down to c.300 BCE), bronze coins circulated in units of 27 to 323 grams. In Phase 2 (c.300-50 BCE), silver and bronze circulated in coined form, with silver accounting for the bulk of value. In addition, silver and especially gold were stored and exchanged as bullion. Between 200 and 167 BCE, Rome captured 38,000 pounds (or 12.3 tons) of gold in war, some of it in the form of Macedonian coins (the *philippeï*). In 157 BCE, the treasury held 17,410 pounds (or 5.6 tons) of gold, which accounted for more than four-fifths of its total cash reserves (with coined and uncoined silver making up the balance). Transfers running into thousands of pounds of gold are repeatedly reported for the first century BCE.²⁰⁴ If these snapshots are anything to go by, gold bullion must have accounted for an unknowable but significant share of monetary media in the late Republican period. Thus, if bronze really accounted for no more than 10-15 percent of the overall value of Roman coinage, its share in the total amount of monetary media including gold (and silver) bullion must have been smaller still, perhaps well under one-tenth. In Phase 3 (c.50 BCE – c.200 CE), coined gold entered the market in very large numbers. Duncan-Jones has estimated that in the 160s CE, 120 million *aurei* (i.e., 880 tons of coined gold) and some 1.7 billion silver coins (i.e., 5,770 tons of coined silver), perhaps three-quarters of them Roman

²⁰¹ Kim 2001.

²⁰² For this concept, see Scheidel 2008b: it refers to all types of coinage that descend from the earliest Lydian and Greek issues in the eastern Aegean in the late seventh century BCE.

²⁰³ Harl 1996: 47.

²⁰⁴ Howgego 1990: 13-4.

imperial issues, were in circulation. The probable share of bronze is guessed at no more than 5-10 percent of the total, for up to 5-6 billion low-value coins. In this scenario (which may well inflate actual quantities), gold accounted for about 60 percent of overall coin value, compared to 30-35 percent for silver and the remainder for base metal coins.²⁰⁵ In Phase 4 (c.200-c.270 CE), progressive debasement reduced silver denominations to a de facto base metal currency while gold coins maintained much of their value. As a result of the decline of silver coin, bronze coins were largely driven from the market. Phase 5 (c.270-c.370 CE) witnessed several failed attempts to restore full-bodied silver coin. Gold remained the only stable value standard. In Phase 6 (c.370-c.700), soon limited to the eastern Mediterranean, attempts to restore silver were finally abandoned and a gold-bronze system remained in place. Cyclical debasement of the base metal tier drove periodic inflation, underscoring the dominance of gold as the only reliable means of storing wealth.

7. Base-metal or precious-metal coinage

7.1. Origins

At its earliest stages, the Roman currency system bore greater resemblance to the Chinese system than to any monetary system that existed anywhere between those two regions. Had Rome and Italy developed in a similarly isolated environment as the early Chinese states, would they have continued to rely on coined bronze while silver and gold would have circulated as bullion? At the very least, the Chinese case demonstrates that this kind of trajectory was perfectly feasible and viable even within a world empire that rivaled the mature Roman empire in terms of both territory and population number. In reality, however, the Italian polities were soon drawn into the Hellenistic monetary system that favored coined silver at the expense of bronze. The Warring States never faced comparably dominant neighbors with centuries-old precious-metal currencies. The coin-sized gold plates of Chu represented the only locally available alternative to the bronze coin system of the Great Plain. As Qin (ultimately largely via the subsequent Han) imposed its *banliang* currency system (again, ultimately in the form of the derivative *wuzhu* standard of the late second century BCE) on all of China, one might wonder what would have happened if Chu had accomplished imperial unification of the Warring States under its leadership, or succeeded in overthrowing the Qin regime in the revolt of 209/8 BCE. Is it reasonable to suppose that in that case, China would have ended up with a bimetallic currency system of coined (or quasi-coined) gold and coined bronze (round or as imitation cowries)?

7.2. Metal supply

Both of these counterfactual questions raise an important issue. How did the physical preconditions for the development of a high-volume precious-metal coinage in western Eurasia compare to those at the opposite end of the continent? In order to address this question, we need to get a better idea of the availability of bullion and the overall size of gold and silver stocks in the Mediterranean and in China to assess the comparative viability of different currency systems.²⁰⁶

According to a recent reconstruction, the Roman empire may have been able to put close to 1,000 tons of coined gold into circulation, as well as six times as much coined silver (see

²⁰⁵ Duncan-Jones 1994: 168-70. But see below, section 9.1.

²⁰⁶ Elements of this and the following sub-section draw on the argument first laid out in the section on “causation” in Scheidel 2008b.

below, section 9.1). As Banaji has argued, gold circulation may have increased even further in late antiquity, from the fourth to the seventh centuries CE, at least in the eastern remnant of the empire: this notion is supported by textual references to large gold stocks in cities and the treasury, by documentary evidence for increasing use of gold in tax payments even at the village level, and by the discovery of gold-rich late antique coin hoards.²⁰⁷ Mining output had long been considerable. In the first century CE, the Baebelo mines in Spain were said to produce 300 pounds of silver per day “for the state” (i.e., presumably as the state’s share rather than gross yield), or 35.4 tons per year. The gold mines of northern Spain reportedly netted 20,000 pounds, or 6.5 tons, per year, while Bosnian gold mines produced 50 pounds per day, or 5.9 tons per year. Subsequent operations in Dacia may well have reached a similar scale.²⁰⁸

No comparable estimates are available for the Han period. However, we are told that the Tang empire enjoyed mining yields of 12,000-15,000 ounces of silver per year (or some 500-600kg at 41g per Tang ounce), although one source refers to as many as 25,000 ounces, or one metric ton.²⁰⁹ These rates are extremely low compared to Roman silver production in Spain. Under the Song, output was boosted to 145,000 ounces in 998 and a record 883,000 ounces in 1022 before dropping to 215,000-220,000 ounces in 1049/78. The most productive prefecture was then credited with 100,000+ ounces per year.²¹⁰ These annual output figures range from 6 to 9 tons. Even the peak in 1022, at 36 tons, merely equals Roman production levels in a single province. In the same period, gold was produced at annual levels of c10,000-15,000 ounces, or 400-600kg, an entire order of magnitude lower than output in any one of the most profitable Roman provinces. If anything, precious metal yields in the Han period must have been lower still: gold was mostly derived from placer deposits while underground mining of gold, in so far as it occurred at all, appears to have been rare: few of the known historical gold mines in China were active in that period.²¹¹ Silver was virtually unknown in central China prior to the Warring States period.²¹² This metal is generally rare in central China and concentrated in the far south, and the earliest evidence for the cupellation of argentiferous sulphide ores comes from the Tang period.²¹³ In fact, because of supply constraints, China appears to have been incapable of establishing a solid silver-based currency system until massive silver imports from Japan, the Philippines and the New World between the mid-sixteenth and the mid-seventeenth centuries injected some 7,300 tons of this metal into the Chinese economy.²¹⁴

Considered together, these various reports, estimates, and conjectures suggest that ancient China might not have been capable of sustaining a high-volume precious-metal currency system *even if* the authorities had wished to do so. At the same time, this notion might seem difficult to reconcile with the historical record concerning the scale of gold stocks and disbursements during the Western Han and Xin periods (see above, section 4.2). If Wang Mang had actually managed to accumulate anywhere near 150 tons of gold in his palace, a “bullion scarcity” explanation for the presumed unsustainability of a precious-metal currency system in ancient China would become more difficult to sustain. As noted in section 4.2, this quantity of gold equals 19 million

²⁰⁷ Banaji 2001: 39-88, esp. 60-5, 76-84.

²⁰⁸ Pliny the Elder, *Natural History* 33.67 and 33.97, with Harl 1996: 81-2 and the references 408-9. See in general Domergue 1990. These figures imply an aggregate total in excess of the national total for China of 10 tons in 1925: Golas 1999: 15.

²⁰⁹ Peng 1994: 278.

²¹⁰ Peng 1994: 430. By 1925, annual output had dropped to a single ton: Golas 1999: 15.

²¹¹ Golas 1999: 109-23, esp. 119-20, and the key to Map 8 (113-8).

²¹² Bunker 1994: 74. Luxury items made of silver were rare prior to the Tang and Song periods: *ibid.* 76-7.

²¹³ Golas 1999: 123-36, esp. 132-3. Hardly any known silver mines were operated in the Han period: *ibid.* 126-32.

²¹⁴ Von Glahn 1996: 133-41. The margins of error are huge but the general order of magnitude ought to be correct. Earlier estimates used to be even higher. Incidentally, von Glahn’s tally is of the same order of magnitude as the estimated total coined silver stock in the Roman empire (see above).

Augustan *aurei* worth 1.9 billion sesterces, more than the annual Roman imperial budget; and it is reminiscent of East Roman government stocks of 129 tons (or less, if silver was also involved) in 527 CE. In order to maintain that gold was *comparatively* scarce in ancient China – i.e., in relation to western Eurasia –, we would have to assume that the Xin government was able to concentrate a much larger share of overall gold stocks in its own hands. This is indeed what scholars have been prepared to believe, though for no better reason than a generic (and, to anyone familiar with the standards of criticism applied to Greco-Roman texts, somewhat naïve) belief in the overall reliability of the contemporary historiographical tradition – and thus in the powers of the central government to implement a measure as sweeping as the “nationalization” of (a very substantial share of all) privately held gold stocks, within a very short period of time.²¹⁵ This is not to say that a model predicated on the notion of a high degree of government hoarding in early imperial China is out of the question: reports from the Northern Song period point in the same direction.²¹⁶

In the end, there are several ways of reconciling the literary tradition about generous Han and Xin gold stocks with the more modest archaeological record and later output figures: the early tallies may be exaggerated; they need not always refer to actual gold; or they may be correct but reflect the successful sequestration of assets by the state. Regardless of which option we prefer, there can be little doubt that gold and especially silver were scarcer in ancient China than in the ancient Mediterranean. Historical comparison shows that the metal supply repeatedly played a critical role in determining the character of different currency systems. The earliest “Aegean” coins were made of electrum found on Mount Tmolos and in the Paktolos River in Lydia. Silver dominated the Greek currency system thanks to the deposits of Attica, Thrace, Siphnos, and Samos. Central Asian and Indian gold supported the Kushan and Gupta dinars. Gold issues by Celtic polities were driven by supply, just as bullion imports from Nubia and the Senegal/Niger region accounted for the temporary shift from silver to gold currencies in the early Islamic Middle East, the opening of new mines in twelfth- and thirteenth-century Europe ended the previous monetary recession, fourteenth-century gold imports from Guinea facilitated the re-introduction of gold coinage in late medieval Italy, the discovery of rich Tyrolean silver mines in the fifteenth century and subsequent massive transfers from the newly acquired Spanish territories of Mexico and Peru sustained the production and eventual dominance of heavy silver coins in western Europe, and Brazilian gold supported the later British gold currency.²¹⁷ All this suggests that the relative scarcity of precious metals in ancient China militated against the creation of empire-wide gold or silver currencies.

7.3. Cultural factors

The impact of supply constraints may have been reinforced by a lack of structural demand for normed high-value low-weight monetary instruments in the form of precious-metal coin. While the reasons for the creation of coinage in western Asia Minor are controversial – and the desire to pay mercenaries may not be the most compelling solution on offer –, and while archaic Greek coinage, once adopted, was frequently used in private market exchange (as the growing evidence for small-denomination silver coins very compellingly shows), subsequent

²¹⁵ The estimate of Qi 1999b: 81 that the Han sources refer to close to 2 million *jin* having being used for various purposes does not tell us anything about the scale of overall gold stocks.

²¹⁶ See Gao 1999: 64 with von Glahn 2004: 171.

²¹⁷ I have borrowed this summary from Scheidel forthcoming b. The Boians’ switch from gold to silver after their move from Bohemia to Slovakia around 60 BCE is a good example (Göbl 1978: 118). For the early medieval Middle East, see Ashtor 1976: 80-1, and for Europe Williams, ed. 1997: 78, 80, 162, 165, 176.

imitations often appear to have triggered by military needs: this is almost certainly true of the Hellenistic kingdoms, imperial Carthage, and Republican Rome, and probably of various Iberian, Celtic, and Iranian polities as well. In the late fourth century BCE, the area of coin use in western Eurasia suddenly increased several times by force of arms alone, and this expansion was subsequently sustained by military funding demands.

In the Warring States period, the major powers drew on conscript armies of tens and perhaps hundreds of thousands of peasants; and even in the Qin and Western Han periods, universal conscription propped up the military apparatus of the unified empire. It was not until the Eastern Han period that professionals, convicts, foreign settlers, and mercenaries took over.²¹⁸ How were these conscripts provided for? I am not aware of any evidence of regular monetary payments in the pre-Han period.²¹⁹ If troops were mostly provisioned in kind, bronze cash would have proved adequate for small additional outlays.²²⁰ It is perhaps not a coincidence that in the same period, at the opposite end of the Eurasian land mass, the Mediterranean power that employed life-cycle conscription of smallholders on an unprecedented scale was also the one that initially disbursed payments in the form of (large) bronze coins and apparently felt no great need for precious metal coinage as long as it primarily faced opponents that employed the same kind of bronze money. It was only when the Roman state became more deeply engaged with Greek or “Hellenized” communities that it added silver coins to its armory.

Even increasing professionalization from the late Western Han period onward need not have caused dramatic changes. The best evidence is provided by excavated coins documents from Gansu and the border regions to the west. Large finds of Qin and early Western Han *banliang* coins in Gansu document monetary demand created by the novel ambitions of the imperial state at the frontier. *Wuzhu* coins were subsequently locally manufactured in large quantities.²²¹ In addition, occasional later references to the arrival of additional coin from central China point to the net transfer of tax revenue in cash from the core to the periphery.²²² Farther west in Xinjiang, finds are mostly confined to (imported) *wuzhu* coins from the Eastern Han period whose presence coincides with Han military occupation.²²³ The wood slips found at the garrison of Juyan in Inner Mongolia throw some light on the importance of coin in a military setting during the late Western Han, Wang Mang, and earliest Eastern Han periods.²²⁴ Values were generally expressed in cash

²¹⁸ Lewis 2000. Note also that the early Tang empire (which restored a Han-type bronze currency) relied on the *fubing* system that combined military service with farming, which likewise limited demand for high-value coin (Graff 2002: 189-90).

²¹⁹ References to cash compensation do not seem to appear on relevant bamboo strips that mention grain and cloth rations. I am indebted to my colleague Mark Lewis for advice on this issue.

²²⁰ Stacks of bronze coins were among the personal belongings of a group of hastily buried soldiers in the capital of Yan (Peng 2000: 173). As noted above, “gold or cash” are mentioned as special rewards for soldiers in the mid-third century BCE Shuihudi bamboo strips (ibid. 170).

²²¹ Wang 2004: XII, 27, who notes local finds of coin moulds.

²²² Wang 2004: 27, 49-50. Tax coin (*fuqian*) was used as (military) salary coin (*fengyongqian*). Two documents (Xie *et al.* 1987: 597 (498:8) and 636 (520:6)) – one of them dating from 80 BCE – mention “Henei tax coins,” indicating long-distance transfers from central Henan province. Xie *et al.* 1987: 230 (139:28) refers to the movement of over 14,300 “tax coins.” However, Wang’s view that according to the Juyan garrison documents such transfers were exceptional and local supply was the norm (2004: XIV) is hard to reconcile with her observation that local coin production appears to have been concentrated in the immediate aftermath of the Wang Mang period when no centrally issued coins were available (27 and esp. 49). We would need to know how coin was supplied under “normal” conditions in order to appreciate the overall significance of regular transfers from the state core.

²²³ However, the subsequent appearance of imitation coins following the Han withdrawal in the second century CE points to non-military demand for cash in this region: cf. Wang 2004: XIII, 39-41 on the Qiuci (Kucha) issues.

²²⁴ Wang 2004: 47-54 provides the most recent survey in English. Some 31,000 wood slips have been found at that site.

terms: more specifically, while military salary entitlements were always quantified in this way, the actual payments could be made either in coin or in kind.²²⁵ It has been argued that cash payments predominated, and Helen Wang notes that the fact that the proposal to resume *wuzhu* production after the restoration of Han rule was reportedly made by Ma Yuan, the governor of Longxi (Gansu), may reflect the demand for cash at the northwestern frontier.²²⁶ However, while these texts leave no doubt that officers and associated civilian officials were at least in part compensated in cash, it is not at all clear whether ordinary soldiers commonly received payments in the form of coin. For instance, the monthly allowance of $3\frac{1}{3}$ *shih* of grain frequently issued to regular servicemen – amounting to 66 liters and equivalent to somewhere around 200-400 cash as well as supplemented by salt rations and smaller food allowances for family members – may well have represented the total compensation of privates and (at somewhat lower pay levels) of convicts.²²⁷ In the mature Roman empire, by contrast, only portions of the nominal salaries of common soldiers were either converted into allocations in kind or retained in personal accounts.²²⁸ Thus, in the Chinese case, initial reliance on conscription, an emphasis on payments in kind, and the absence of competitors operating precious-metal currency systems failed to create strong demand for large quantities of standardized high-to-medium-value and low-weight monetary objects.

The extent to which different elements of the population used precious metal for monetary purposes is also relevant here. A much later observer, Gu Yanwu in his “Record of Daily Knowledge,” may have claimed that “during Han gold circulated among both upper and lower classes.”²²⁹ However, later reports were ultimately spun out of reports of large amounts of yellow *jin* handed out by Han rulers, and need not reflect any genuine knowledge of past conditions. As I have outlined above (sections 4.1-2), gold use was primarily – albeit not exclusively – associated with elite protagonists. If this image reflects reality, it might be helpful to define the imperial monetary system in terms of “transactional orders.” This concept, developed by Parry and Bloch and recently applied by Kurke to the study of exchange and monetization in archaic Greece, derives from the observation that “many societies constitute the activities of exchange and economics as two separate but organically articulated transactional orders” – a “long-term transactional order [that] is always positively valued, insofar as it is perceived to perpetuate and reproduce the larger social and cosmic order,” and a short-term order in the sphere of individual acquisition that “tends to be morally undetermined since it concerns individual purposes which are largely irrelevant to the long-term order.”²³⁰ In the early Greek context, Kurke singles out binaries “opposing the symbolic ‘refined gold’ of aristocratic *hetairoi*

²²⁵ One document orders values to be given in cash (*quan*), and accounts that list both money and goods value both in coin: Wang 2004: 48, who also lists numerous cash prices of various goods (59-64 table 17). On military salaries, see *ibid.* 48 and already Loewe 1967: I 93-8.

²²⁶ Wang 2004: 49-51 and 27.

²²⁷ Officers: Loewe 1967: I 96; Wang 2004: 49 table 4. Rations: Loewe 1967: I 93-4, II 69-71. For instance, a section commander received as little as 900 per month in cash (Loewe 1967: 96). If soldiers had received substantial amounts of cash on top of their food rations they would have been as well compensated as junior officers. It would seem more reasonable to consider regular cash payments as a marker of elevated status within the military hierarchy.

²²⁸ See Herz 2007: 308-13 for a concise up-to-date summary for the situation in the early monarchical period; and cf. also Rathbone 2007. Compensation in kind gained in importance from the third century CE onward as the imperial silver currency declined.

²²⁹ Peng 1994: 135 n.9.

²³⁰ Kurke 1999: 14-5. This aspect warrants more detailed investigation: the Chinese annals habitually locate counterfeiting among “the people” whereas gold tends to be portrayed as circulating in more pristine environments.

to the ‘counterfeit coin’ of the excluded *kakoi*, opposing the stable and secure circuit of elite gift exchange to the indiscriminate and promiscuous circulation of money in the public sphere.”²³¹

The memorial of Chao Cuo, set in 178 BCE, might profitably be interpreted within this framework, emphasizing as it does the subversive potential of high-value objects: “Pearls, jade, gold, and silver [...] are light, small articles, and are easy to hide. Having them in one’s grasp [a person] can travel all around within the seas without the hardships of hunger or cold. These cause those in government positions lightly to turn their backs upon their rulers; [these cause] people indifferently to go away from their native townships; [these give] thieves and robbers the incentive [for crimes]; and [these make] fugitives able to have lightweight wealth.”²³² By contrast, the text goes on to relate, grain or textiles are too heavy to carry around, yet essential for survival – the implication being that those without access to precious low-weight items are reduced to using these commodities and hence safely pinned down. “For this reason an enlightened ruler esteems the “five grains,” and despises gold and jade.” Although this text does not say in so many words, the physical burden represented by high-value amounts of bronze coins would also have served to constrain undesirable mobility.

Nevertheless, with regard to Han China, transactional constraints may well have been more relaxed in practice: the anecdotes related in section 4.2 suggest that commoners were free to handle gold in as much as they were able to afford to. De facto, however, most people, for most of the time, must have been excluded from the gold economy. At first sight, the situation in the Roman empire from 367 CE onwards, and essentially already since the 260s CE, bears a strong resemblance, in formal terms, to that in Qin-Han China: in both cases, the monetary system was built around a two-tier structure of gold and bronze. Looked at more closely, however, profound differences come to the fore. The late Roman system relied on (coined) gold as an anchor while bronze or copper were periodically abandoned to debasement and devaluation. This *modus operandi* was conducive to the formation of a corresponding two-tiered economy of privileged recipients and owners of (reliable) gold coin and disadvantaged users of (unreliable) base metal denominations, creating strong structural demand for gold that had no parallel in ancient China. In fact, as the Han bronze coinage remained stable for most of the time, the impetus for a “flight into gold,” if it existed at all, would have been much weaker than in the unstable monetary environment of the later Roman empire. In consequence, gold use would have remained more (socially) limited than in the later Roman empire.

Conditions in ancient China may have had more in common with those in Republican Rome, where gold bullion served as a means of payment, store of wealth, and unit of account. While its overall significance for the late Republican economy is difficult to determine, Hollander stresses the casual way in which elite sources (especially Cicero) refer to the use of uncoined gold and silver in monetary transactions: bullion was clearly regarded as a useful and not at all uncommon form of money.²³³ On occasion, recipients could even be low class, such as soldiers or even slaves.²³⁴ Overall, however, bullion transactions appear to have been limited in the first instance to the state, the wealthy, and traders. The key difference lies in the relative abundance of silver that could be turned into coin in the West and its near-absence from early China.

However, the existence of a stable bronze-coinage system, the apparent scarcity of gold and especially silver, and low structural demand for precious-metal coin are insufficient to account for the fact that gold and silver did not normally circulate in coined form – *not even in*

²³¹ Kurke 2002: 93. See esp. 1999: 41-64, 101-29.

²³² *Hanshu* 24A: 11a.

²³³ Hollander 2007: 31-9.

²³⁴ Cicero, *For Caelius* 51; Plutarch, *Cato the Elder* 10.4, cited by Hollander 2007: 31-2.

*limited quantities.*²³⁵ The stamped gold plates of Chu would have provided a workable template, and later on, the Chinese state encountered “Greek-style” coins in its western protectorate in Xinjiang. Hybrid “western”-type coins that combined Karoshthi (i.e., Indian) and Chinese legends were in fact produced at the intersection of the two monetary spheres,²³⁶ yet were not imitated in China proper where precious metal coins were only issued under foreign domination.²³⁷ Later arrivals of Sasanid and early Byzantine coins ended up as jewelry items. From the Han perspective, precious metal coins were a feature of strange and distant barbarians such as the Parthians and Romans.²³⁸ The production of massive numbers of low-value bronze coins became a defining characteristic of restorationist dynasties such as the Tang and Song. Even as China moved to a silver-based economy from the Song period onward and imported vast amounts of foreign silver under the late Ming, precious metal continued to circulate as bullion alongside base-metal coins and, intermittently, paper money.²³⁹ Any attempt to explain this long-term resistance to precious-metal coins would require much more extensive consideration of cultural features than is possible here.

Asking the question of why something did *not* happen (and thereby implying that it really ought to have happened) may smack of what has been called the “inventionist fallacy,” the assumption that activities (such as advanced pre-modern levels of monetary exchange) that commonly rely on a particular mechanism (such as precious metal coinage) could not have been properly performed in the absence of this mechanism. Yet such concerns would be misplaced. The experience of the ancient Near East very clearly shows that elaborate systems of monetary exchange do not require coined money.²⁴⁰ In a case like that, it would be meaningless to ask why coined cash was not developed or how its absence may have impeded economic performance. Ancient China, however, differed from ancient Egypt or Mesopotamia in a crucial way. Coined money was not only not unknown, it was in fact produced in huge quantities, running into tens of billions over the course of the Han period. This suggests that the ubiquitous presence of base-metal coin does not necessarily precipitate the concurrent use of precious metals in an analogous format. This simple observation invites us to take a fresh look at the contextual determinants of the creation of electron, gold, and silver coinage in western Asia Minor in the late seventh or early sixth century BCE.²⁴¹ The complete lack of visual imagery on Chinese coins (beyond the simple elegance of the central hole) likewise merits attention. The contrast between the outcomes of Aegean and Chinese coin creation is rendered all the more striking by the fact that Chinese coins were developed in circumstances that shared putatively important features with the world of the archaic Greek polis: they emerged within a cluster of highly competitive polities (which had been created out of city-states) vying for supremacy that would have had obvious uses for visual imagery highlighting the origins of coins beyond mere ideographs, and spread at a time of

²³⁵ In Scheidel 2008b I draw attention to the fact that even in medieval Japan, where Chinese round coins were imitated from the seventh century CE onward, the dominant copper issues were occasionally supplemented by silver (and once also gold) coinage produced in the same format.

²³⁶ Thierry 2003b: 73, 76; Wang 2004: XIII, 37-8.

²³⁷ Rare well-made silver *wuzhu* coins modeled on Eastern Han *wuzhu* are thought to be later imitations, perhaps in the wake of the Tang silver “Inaugural coin” (Peng 1994: 146). Irregular *silver wuzhu* coins have been excavated from a Six Dynasties tomb in Nanjing, perhaps contemporary counterfeits (ibid.).

²³⁸ *Hanshu* 96A, in Hulsewé 1979: 106, 115, 117: gold and silver coins showing a rider and face in Jibin (Gandhara/Kashmir); coins showing face and rider in Wuyishanli (Arachosia); silver coins showing the king’s face in Anxi (Parthia). According to *Hou Hanshu* 88D, in Daqin (the Roman empire) “they make coins from gold and silver, ten pieces of silver being equal in value to one piece of gold” (trans. Leslie and Gardiner 1996: 50). For discussion, see Leslie and Gardiner 1996: 224-5.

²³⁹ Von Glahn 1996.

²⁴⁰ See esp. Le Rider 2001, and forthcoming work by Peter Vargyas.

²⁴¹ For recent discussion, see von Reden 1995; Kurke 1999; Schaps 2004.

unprecedented social and economic development and mobility.²⁴² This suggests that existing inquiries into the origins and development of Aegean or Chinese coinage that ignore contextual contrasts and similarities between western and eastern Eurasia are inherently incapable of meaningful causal analysis.²⁴³ Explication of the long-term and ultimately near-global success of the “Aegean” model of precious-metal coinage requires close engagement with the real-life counterfactual provided by the Chinese evidence.

7.4. A preliminary explanation

I have identified three factors that may have accounted for the creation and long-term persistence of a monetary system based on coined bronze and uncoined gold and silver in China: the bullion supply, military demand, and cultural preferences. The relative scarcity of gold and silver would have made it difficult to sustain precious-metal currencies. This interpretation is consistent with the fact that the only early state (Chu) that issued what might be called proto-coinage in gold was located in the only (comparatively) gold-rich part of central China. Furthermore, the apparent absence of strong demand for low-bulk high-value denominations in the context of military recruitment may have further reduced the appeal of precious metal coinages during the formative stages of the imperial system. However, these factors cannot by themselves explain the state’s continuing rejection of silver coins even in the Ming period when huge bullion stocks had finally become available. Once the Qin had (at least in theory) imposed an empire-wide uniform standard of low-value bronze coin and the Han had shored up this regime by disseminating tens of billions of these money objects, later dynasties that sought to link up to the ancient imperial tradition had come to regard this particular currency system as a vital element of “proper” governance and shunned alternative options even when they became feasible. If we want to explain the divergent development of money in western and eastern Eurasia, we need to find ways to assess the relative significance of each of these variables and their interconnectedness.

8. Metallism and nominalism

Debates about the nature of money in historical societies revolve around the concepts of “metallism” and “nominalism” (also known as “chartalism”). The former defines money as a commodity whose monetary value is determined in the first instance by the market price of its constituent elements such as gold or silver (plus labor) whereas the latter considers money’s value to be distinct from that of its medium and envisions monetary value as a function of state fiat. Modern scholarship tends to stress the metallistic foundations of the Roman imperial and provincial currencies on the one hand and the fiduciary character of early Chinese coin on the other.²⁴⁴ However, the implied contrast between these two systems is in large part imaginary:²⁴⁵ it neglects both the fiduciary dimension of Roman coinage and the physical constraints that

²⁴² E.g., Hsu 1965.

²⁴³ Comparative approaches have been rare: so far Schaps 2006 and Scheidel 2008b are the only exceptions.

²⁴⁴ Strobel 2002: 91-3 lists references to scholarship on Roman coinage that adopts a metallistic perspective. For China, see esp. Thierry 1993, 2001a, 2001b.

²⁴⁵ See Thierry 2001a: 132-3 for a particularly dichotomous vision: “En Occident, la monnaie ... se fonde sur le fait que sa valeur d’échange est fonction de sa valeur intrinsèque. (...) La monnaie chinoise repose sur des bases différentes ... à l’inverse de l’Occident, en Chine, c’est la valeur d’échange du signe monétaire qui détermine sa valeur intrinsèque.”

governed coin use in China. Despite profound differences in terms of the relative value of the constituent elements of their monetary objects, the two currency systems had much in common. In both cases, the exchange value of coins was determined by a combination of their intrinsic – metal – value and users’ willingness to accept them at their nominal value, a willingness that in turn depended on a whole range of factors such as information costs, trust, and choice, all of which were to some extent a function of state power and policies.

The “fiduciary model” of Chinese money suffers from a variety of problems. For example, it needs to account for the fact that Qin coins were explicitly labeled with a weight denomination (*banliang* or “half-ounce”) that the state at least initially sought to adhere to.²⁴⁶ One recent observer notes the “apparent contradiction of having a fiduciary coinage where the coin inscription indicated a precise weight.”²⁴⁷ But this contradiction becomes apparent only in retrospect, in the context of gradual weight loss over time. However, the incontrovertible fact that for much of the third century BCE coin weight trended lower must not be interpreted as a sign that it was somehow irrelevant: competition by underweight local issues and budgetary pressures on the central authorities are among the most obvious alternative explanations. From this perspective, the eventual co-existence of overweight, “regular,” and – above all – underweight *banliang* coins was the result of chance, not design.²⁴⁸ State-manufactured “regular” Qin coins – both of the Shang Yang period and afterwards – document a desire to match weight and formal denomination.²⁴⁹ It was only under the pressure of the terminal wars of unification that weight standards kept sliding.²⁵⁰ What we are observing is the incremental erosion of a system of ideally full-bodied bronze coin that was unable to withstand the stress of continuous large-scale war and consequently spiraling state demands.

I already noted above that the Qin regulation that sought to enforce indiscriminate use of coins of uneven quality hints at the existence of divergent everyday practices in the subject population (see above, section 2). Be that as it may, it is simply incorrect to claim that the “bamboo slips from Yunmeng *prove* that Chinese coins did not have an intrinsic value, but instead functioned as a medium of payment, *agreed upon* by the state and the people” (my italics).²⁵¹ These texts “prove” nothing of this kind: the only thing they demonstrate is the state’s avowed intention to coerce its subjects into accepting state-issued coin without regard to its precise physical characteristics. They do not and indeed cannot reveal whether this measure met with success or failure, nor do they tell us anything about the ambitions of the state beyond the confines of the late Qin period. Moreover, the fact that this fiduciary premise was unilaterally imposed by the state rather than in any meaningful way “agreed on” by society might be taken to suggest that a genuine token coinage was not a viable option.²⁵² This impression is reinforced by Jia Yi’s memorial of 175 BCE that referred to the people’s habit of assessing coins according to their physical properties, a practice that would seem unsurprising and indeed unavoidable if coins

²⁴⁶ See above, section 2. It would be unwarranted to regard the introduction of the *banliang* as a break with an earlier fiduciary tradition, as suggested by Thierry 1993: 3. For instance, cowrie shells, by virtue of being scarce goods, would have had an intrinsic value, and we have no way of telling how the metal value of tool money was related to its face value. Moreover, the discovery of lumps of bronze that may have served as precursors of later bronze coin (Dai and Zhou 1998) indicates that metal content may have been the original source of value for monetary objects made of this material.

²⁴⁷ Wang 2004: 12. See likewise Thierry 1993: 4.

²⁴⁸ For this outcome, see above, section 2; Thierry 1997: 173-5.

²⁴⁹ 28 relevant specimens in Thierry 1997: 247-50 (*banliang* Types II-III) yield an average weight of 7.99g, very close to the nominal target weight of c.7.8g.

²⁵⁰ Strongly underweight Qin coins date from the very late Warring States period in third century BCE: Thierry 1997: 175.

²⁵¹ Wang 2004: 13, with reference to Hulsewé 1985b, who does not actually support this statement.

²⁵² Even Thierry 1993: 4 must concede that Qin monetary policy was constrained by actual practices in the general population.

were thought to be valuable because of their weight and fineness but unintelligible if unquestioning acceptance of fiat issues had been the norm.

Once state revenues had been put on a more solid basis, the maturing Han state was able to take proper account of metallistic concerns. Thus, while the early Han *banliang* issues had continued the Qin trend towards creeping weight loss, the introduction of the *wuzhu* format in the 110s BCE marked a fundamental shift to long-term consistency and fairly stable intrinsic value. *Wuzhu* coins of the Western Han period in two (partly overlapping) modern samples exhibit a bell-curve-shaped weight distribution that leaves no doubt that state mints aimed for a set target weight that was subject to periodic adjustment (Figures 2-3 and Table 1).

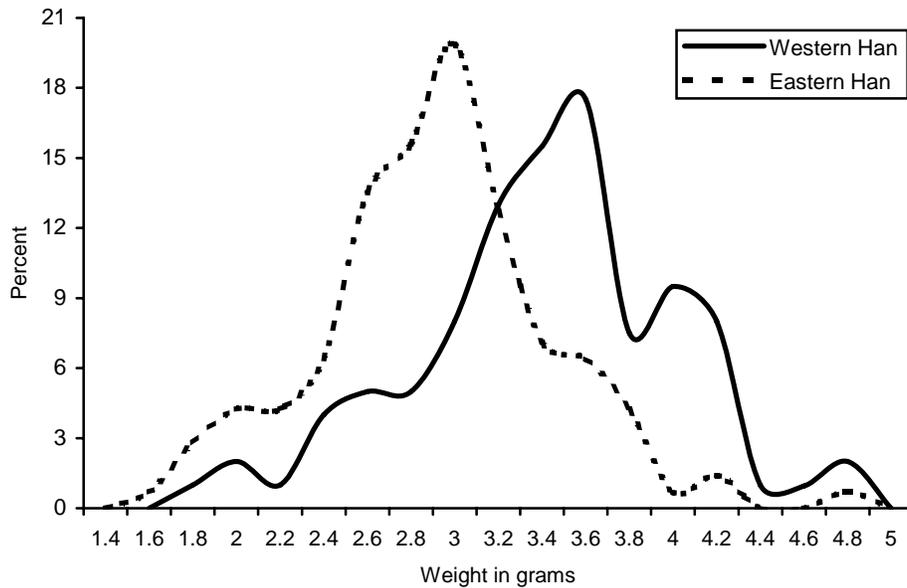


Figure 2 Weight distribution of 241 *wuzhu* coins (113 BCE – 184 CE)
Source: Thierry 2003a

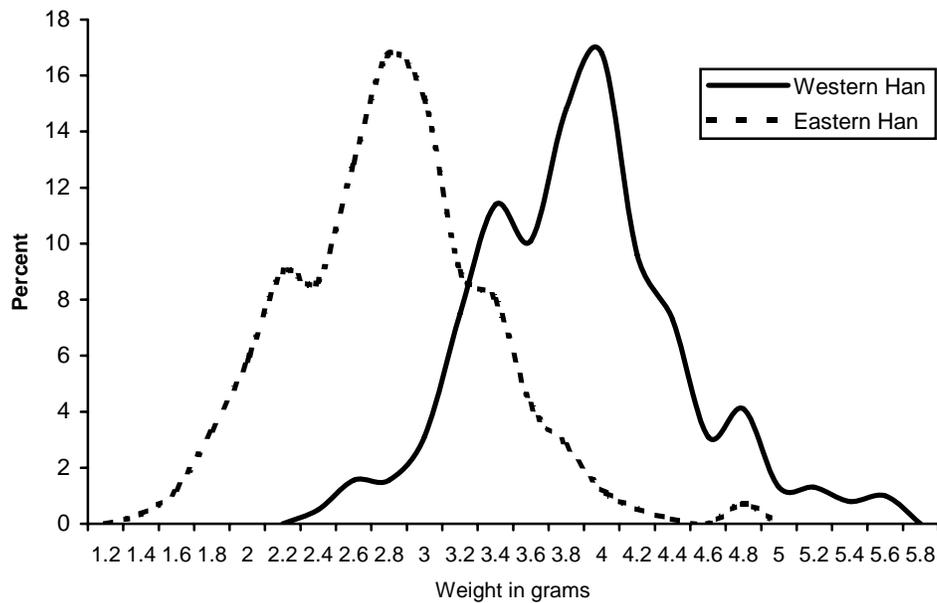


Figure 3 Weight distribution of 476 *wuzhu* coins in the collection of the Shanghai Museum (118 BCE – 184 CE)

Source: Shanghai Bowuguan qingtongqi yanjiubu 1970

Table 1: Mean weight of *wuzhu* coins in different periods

Period	Number	Mean weight in grams
118-113 BCE (Thierry 2003a)	44	3.90
113 BCE - 8 CE (Thierry 2003a)	100	3.40
113-49 BCE (Thierry 2003a)	50	3.68
33 BCE - 8 CE (Thierry 2003a)	29	3.04
23-184 CE (Thierry 2003a)	141	2.91
118 BCE - 8 CE (Shanghai ... 1970)	193	3.87
23 CE – 184 CE (Shanghai ... 1970)	283	2.80

It catches the eye that the earliest *wuzhu* issues (118-113 BCE) tend to exceed their nominal weight of 5 *zhu* by an average margin of 20 percent (or 1 *zhu*). If metal content mattered to users, this would have been a suitable means of establishing the credibility of the new currency that may however not have been viable in the long run.²⁵³ For the remainder of the Western Han period, average coin weights closely approximate the notional target weight.²⁵⁴

²⁵³ Compare overweight Qin *banliang* pieces in the first half of the fourth century BCE: see above, n.***. Thierry 2003a: 36 reports that most of the approximately 2,000 early *wuzhu* coins found in a tomb in Mancheng that dates from 113 BCE range from 2.9 to 5.2g. See Fig. 4.

²⁵⁴ See Table 1, Thierry 2003a sample for 113 BCE - 8 CE. The discrepancies between the Shanghai and Thierry samples in terms of weight distribution and mean weight appear to be due to the preponderance of earlier (and thus heavier) specimens in the Shanghai collection.

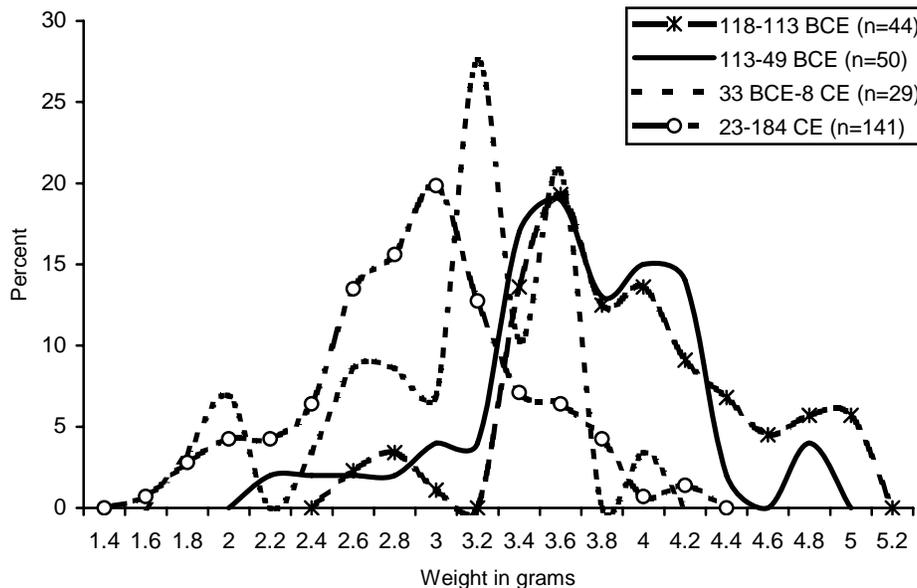


Figure 4 Weight distribution of 264 *wuzhu* coins (118 BCE – 184 CE)
Source: Thierry 2003a

A more detailed breakdown reveals that these broad averages and overall distribution patterns conceal gradual change over time (Figure 4). Until the mid-first century BCE, the nominal standard of 5 *zhu* appears to have served as a lower limit rather than as a genuine target weight, given that a large proportion of specimens exceed 5 *zhu*. It was only in the final decades of the Western Han period that production aimed for an actual target weight of 5 *zhu*. This slide continued in the Eastern Han period, resulting in a reduction of about 25 percent relative to the initial mean weight of the mid-110s BCE. It is striking that in both samples, Eastern Han coins were consistently cast according to a target weight of 2.8g to 3g that was approximately 10 percent short of the nominal weight. The bell-curve shape of these distributions indicates that this was mint policy rather than just random slippage. It appears that the state aimed to strike a balance between metallistic stability and the ever-present desire to increase revenue. This cautious approach is inconsistent with the notion that coins were mere tokens and that users were indifferent to its metal content. Instead, it is reminiscent of the Roman imperial policy of very slowly reducing the weight and fineness of its precious-metal coins (see below).

Observable variation in fineness reflects some measure of awareness and appreciation of intrinsic value. Metallurgical analysis of ancient Chinese coins is still in its infancy and much more work needs to be done to provide us with representative results. Nevertheless, preliminary work in this area has already begun to shed light on general trends. According to a pioneer study, mean copper content averages 74 percent in a very small sample of coins from the unified Qin and early Western Han periods and subsequently rises to 92 percent in specimens dating from the mid-second century BCE to the mid-second century CE, while the share of lead dropped from 15 to 1.5 percent. During the following 1,000 years, fineness was consistently positively correlated with state strength. By analogy, this suggests that for some three centuries Han finances were in reasonably good shape and that the state was committed to maintaining high coin quality and

stable weights.²⁵⁵ Once again, this pattern is logically consistent with a metallistic tradition of valuing coin but hard to reconcile with the notion of a predominantly fiduciary currency system.

Moreover, the repeated failure of genuine token issues provides an even stronger and potentially decisive argument against the latter. The unsuccessful experiments of Wudi and Wang Mang are a case in point. While it is true that the historiographical tradition was hostile to these two emperors and sought to cast their actions in an unfavorable light, the short-lived nature of their respective token coinages is an objective fact that is supported by the archaeological record and not merely a facile impression generated by negative spin. Wudi's "White Metal," "Hide Money," and "red-rim" coins as well as Wang Mang's *daqian*, knives, and spades had been introduced in response to surging state demand for revenue and a concurrent desire to discipline entrenched elites.²⁵⁶ Even if we were to disregard the reasons for their failure proffered by biased sources we would nevertheless have to conclude that these token issues did not achieve the desired results: if they had been viable they would not have been abandoned as rapidly as they were. Due to the nature of the evidence, we cannot be sure whether it was public noncompliance and fraud (as intimated by the sources) or sudden price inflation or both that doomed these innovations. In the following centuries, unmet fiscal needs periodically triggered similar token issues that also lacked staying power.²⁵⁷

I am not aware of any direct evidence for the intrinsic value of coins from the pre-imperial or Han periods. In the Tang mints around 750 CE, the production of 1,000 coins consumed 123 *liang* (then 5.043kg) of a normed alloy comprised of approximately 83.5 percent copper, 14.5 percent lead, and 2 per cent tin. Allowing for wastage during the production process, the finished coins were supposed to weigh 100 *liang*, or 4.1g each, and it cost the authorities 750 coins to produce a string of 1,000.²⁵⁸ This implies that the intrinsic value of 123 *liang* of this alloy plus labor costs and other overhead such as fuel added up to 750 cash. While the latter expenses are impossible to quantify, the application of mass manufacturing techniques makes it seem likely that raw materials accounted for most of the overall cost of coin production. A simple thought experiment indicates the limits of the plausible. If there had been no expenses beyond the procurement of metal (which cannot have been the case), the intrinsic value of a finished coin would have equaled 61 per cent of its face value. On the other hand, if metal had accounted for not more than two-thirds of total production expenses, the intrinsic value would only have been 41 per cent of the nominal value. It therefore seems likely that coins were denominated at approximately twice their metal value.²⁵⁹

The average copper content of Han *wuzhu* coins that have undergone metallurgical analysis is around 85 percent, similar to properly normed Tang issues.²⁶⁰ On the simplifying assumptions that the intrinsic value of a given amount of alloy of a (high-quality) Han or Tang coin equaled close to 90 percent of its weight in copper (given that admixtures such as lead must have been cheaper than copper), and that in the late Western Han period 21,000 *wuzhu* coins bought 1 *jin* of gold, gold would have been worth roughly 500 times its weight in (uncoined)

²⁵⁵ Coins from the late second century CE until the end of the Period of Disunion show lower copper (c. 70-80 percent) and higher lead (c. 15-20 percent) content. The early Tang period witnessed improved standards (85 percent copper in the seventh century CE) followed by drops in the eighth and ninth centuries (mostly 60-80 percent copper). Song coins show a slow slide from 66-77 percent before 1068 to 63-73 percent from 1068 to 1127 and 56-73 percent later on. See the measurements in Bowman, Cowell and Cribb 2005: 11-19. As Bowman, Cowell and Cribb 2005: 7 fig.2 and Cowell *et al.* 2005: 65 fig.1 show, Han standards of fineness were never re-attained in later periods.

²⁵⁶ See above, sections 3.2.-3 and 4.2.

²⁵⁷ See above, section 3.5, and cf. Thierry 1993: 7-8.

²⁵⁸ Thierry 2003a: 115, with source references.

²⁵⁹ For modest seigniorage in the subsequent Northern Song period, cf. von Glahn 2004: 168.

²⁶⁰ Bowman, Cowell and Cribb 2005: 11. However, the actual copper content of Tang coins from the eighth century CE tends to fall short of the official standard: *ibid.* 12.

copper.²⁶¹ This ratio is comparatively low but by no means impossible. In China in the second half of the fourteenth century, gold may have been valued at 1,600 times its weight in copper, and in 1908 this ratio stood at 1 to 1,645.²⁶² However, in neither one of these periods did the currency system depend on mass production of bronze coin that drove up demand for copper. In the Tang and Song periods, by contrast, inelasticities in copper output constrained coin production and monetization: as a consequence, copper prices rose relative to those of other metals. Mass-manufacturing of *wuzhu* coins for much of the Han period would likewise have boosted the relative value of copper.²⁶³

Later records support this conjecture. In the eleventh century CE, the minting of cash regularly absorbed some 4,000 tons per year, equivalent to the entire output of the copper mines of Northern Song empire.²⁶⁴ While this tally is a multiple of the 700-850 tons of copper that had been required to produce 230 million Han *wuzhu* coins per year in the late Western Han period, it is likely that mining yields had greatly increased during the intervening 1,100 years.²⁶⁵ No output figures are available for the Han period. All we know is that volume of silver production increased between 10 and 15 times between Tang and the Northern Song periods.²⁶⁶ It is impossible to tell whether copper production grew to a similar extent.²⁶⁷ However, if annual copper yields had risen only by a few times between the Han and the Northern Song periods – much less than silver output rose from the Tang to the Song periods – the production of *wuzhu* coins would have been sufficient to put a heavy strain on the copper supply of the Han state, driving up the price of this commodity. In fact, comparative evidence from other parts of the world shows that specific configurations of supply and demand were perfectly capable of generating high copper prices. For example, in Alexandria in Egypt around 1400, gold was worth only 490 times as much as copper, a ratio that happens to match my estimate for the late Western Han period.²⁶⁸

In light of all this information, there is nothing to suggest that the intrinsic value of Han bronze issues was minimal or strictly dissociated from their nominal valuations and therefore of minor importance, let alone irrelevant. Instead, various strands of evidence are consistent with the notion that the market showed awareness of the intrinsic value of coins and priced them accordingly.²⁶⁹ User discrimination based on the physical properties of coins (as insinuated by the

²⁶¹ Gold: see above, n.***. 21,000 *wuzhu* ~ 68,250g of alloy ~ 61,425g of copper times two to account for the higher face value ~ 250g of gold.

²⁶² Peng 1994: 489-90, 760, 762. In England around 1400, gold was worth 2,400 as much as copper: Blanshard 2005: 1456 (at c.16 grains per gold shilling).

²⁶³ In this context it also merits attention that reported gold prices from the Western Jin period and the Period of Disunion (280-589 CE) – when levels of bronze coin production were low – were high, with one (Han) *jin* priced at 100,000 or 150,000 cash (Peng 1994: 202-3 nn. 4-5 with references). However, due to uncertainties regarding the “typical” weight of bronze coin in this period it is difficult to deduce real gold/bronze ratios (*pace* Peng 1994: 203). If “cash” refers to Han *wuzhu* coins (which continued to circulate in large quantities), this ratio could have been as high as 1,300-1,950; for more light-weight bronze coins, ratios would have been correspondingly lower.

²⁶⁴ Von Glahn 1996: 49.

²⁶⁵ The estimate of 700 tons is based on an annual production of 230 million *wuzhu* coins with an average copper content of 92 percent whereas the higher figure of 850 tons takes account of the processing losses implied by the Tang regulations mentioned above.

²⁶⁶ Peng 1994: 278, 430.

²⁶⁷ For a surge in copper output *during* the Northern Song period, see Golas 1999: 87-8.

²⁶⁸ Blanchard 2005: 1211. One report even puts the gold/copper ratio in Mali in 1353 at 240 to 1: *ibid.* 1514. However, unlike ancient China, Mali was a gold-rich environment. Comparative evidence from different parts and periods of the ancient Mediterranean points to silver/bronze ratios of 50-120 to 1 (von Reden 2007: 74 n.53, with references) which imply gold/bronze ratios of the order of 500-1,500 to 1.

²⁶⁹ Cf. also von Glahn 2004: 168. Thierry 2001a errs in consistently foregrounding ideology at the expense of logic and basic economics. Thus, if early China had truly been “profondément attachée à une monnaie

Qin rules of the *Jinbulu* and explicitly reported in Jia Yi's memorial in the *Hanshu*), the state mints' sustained focus on target weights and levels of fineness in times of fiscal stability (as borne out by numismatic material from the Shang Yang, late Western Han, early Eastern Han, and early and mid-Tang periods), the multiple weight adjustments of the Han *wuzhu*, the ratio of intrinsic to nominal coin value prescribed in the mid-eighth century CE, and the persistent failure of genuine token issues all converge in supporting this conclusion. What is more, these trends continued beyond the Tang period. To the best of its – increasingly limited – abilities, the Song state sought to supply the market with large quantities of full-bodied bronze issues and charged only modest seigniorage. As a result, bronze coin served a store of value and hoarding by the wealthy was common.²⁷⁰ Conversely, both the debasement of existing coin types and the introduction of token coins were known to prompt counterfeiting and price inflation.²⁷¹

Schematic distinctions between a “Western” preference for “full-bodied” coin and the “fiduciary” monetary tradition of China are at best exaggerated and at worst seriously misleading. The mature Han currency system accommodated a significant degree of seigniorage due to the basic fact that production costs for base-metal coin are non-trivial relative to the price of the raw materials. Moreover, centralized mass production of carefully normed coins and legal injunctions against private issues raised the cost of counterfeiting. Taken together, these factors supported a relatively high monopoly price of state coinage: under these circumstances, even if the nominal value of a *wuzhu* coin exceeded its metal value by 100 percent, the use of state-manufactured base-metal coin at nominal exchange rates remained the least costly option for the general population. It was only when the state introduced cash that was overvalued by a margin that was high enough to be both conspicuous and render imitations profitable that “Gresham’s Law” became operative, price inflation ensued, and counterfeiting proliferated. Multiples of 300, 500, and 3,000 cash under Wudi, of 5, 25, 50, and up to 10,000 under Wang Mang, of 100, 500, and up to 5,000 in the Three Kingdoms, and of 10 under the Song all fall in this category.²⁷² The system tolerated only a moderate degree of currency manipulation.

This limited elasticity of the ratio of intrinsic value to nominal value was by no means unique to early China.²⁷³ Regarding this relationship, comparison between the currency systems

idéalement fiduciaire” (133), why was the assignation of the same nominal value to coins of 3g and 10g “n’est pas admissible par la population, et l’imposer est, dans l’optique confucéenne, un cas exemplaire de rupture du contrat entre l’État et le peuple” (134). And if this (relatively moderate) imbalance was incompatible with putatively “Confucian” preferences, how can we define the *wuzhu* tradition as a “pratique ... donc confucéenne (monnaie fiduciaire) avec une apparence légiste (lingot de métal à poids marqué)” (135)? It is likewise naïve to explain Wang Mang’s budget-boosting reforms purely as an ideological response to the aforementioned hybrid arrangement – “Le régime idéologiquement confucéen et antilégitime de Wang Mang ... ne se satisfait pas de cette contradiction” (135). And finally, if fiduciary issues had really been a perennial ideal, why would it have been the case that “l’inscription pondérale “5 *zhu*” posera un grave problème à toutes les dynasties postérieures aux Han qui ne seront que rarement capables d’émettre une monnaie don’t les poids corresponde véritablement à l’inscription” (136)? This solipsistically ideational framework is inadequate for a realistic appreciation of monetary processes.

²⁷⁰ Gao 1999: 38, 64; von Glahn 2004: 168, 171. In the Roman empire in the fifth century CE, low-grade base-metal coins known as *nummi* were readily counterfeited and commonly appear in hoards of the fifth century CE (Harl 1996: 179). This shows that despite their low intrinsic value, these coins were nevertheless considered sufficiently valuable to be forged out of even cheaper materials than those employed by the authorities, and likewise valuable enough to be hoarded as a store of wealth.

²⁷¹ Miyazawa 1998: 349, 353; von Glahn 2004: 173, 177. This is why convertibility was crucial for the success of early paper money: *ibid.* 173.

²⁷² See above, sections 3.2-3 and 3.5; Thierry 1993: 7-8; von Glahn 2004: 173.

²⁷³ *Contra* Thierry 1993: 10, who invokes “la spécificité chinoise en matière monétaire: la monnaie reste un instrument d’échange don’t la valeur repose sur la confiance et la mise en place d’un contrat tacite entre less différents acteurs économiques,” this was also true of other currency systems, most notably that of the Roman empire in the first few centuries CE. Ultimately, of course, *all* money use rests on confidence.

of the Han and Roman empires reveals striking similarities. The target silver content of the Roman *denarius* of one eighty-fourth of a pound (c.3.85g) remained unchanged for two centuries from the 180s BCE until the early first century CE. Instances of exceptionally intense pressure on state finances occasioned only relatively minor and short-lived debasements around 90 BCE and in the 30s BCE (see above, section 6.1). From 64 to 235 CE – very slowly at first and at an accelerating rate later –, the mean silver content of the *denarius* fell by about 56 percent.²⁷⁴ It is unknown to what extent prices rose in response to the decreasing intrinsic value of newly minted coinage.²⁷⁵ Usable serial price data are largely confined to Roman Egypt where the mean silver content of the provincial Alexandrine tetradrachm fell by around 30 percent between the 60s and the 160s CE while prices remained stable and by another 50 percent between 170 and 192 CE. The latter drop coincided with a rapid doubling of prices.²⁷⁶ This might be taken to suggest that sudden large changes in metal content were more likely to impact prices than slow gradual debasement. Between 238 and 269 CE, as fiscal demands escalated and precious metal supplies diminished due to incessant military campaigning and temporary internal fragmentation, the silver content of the new imperial silver coin (the “double” *denarius* known as *antoninianus*) fell by 98 percent: gross coin weight was almost halved while fineness was reduced from 50 to 1.7 percent.²⁷⁷ Once again, the consequences of this precipitous slide remains obscure. Much the same is true of bimetallic exchange rates. The gold content of the imperial *aureus* had gradually been lowered by 55 percent between the early first century and the 240s CE, tracking but not fully keeping up with the concomitant loss of 75 percent of the silver currency’s intrinsic value. In the 250s and 260s CE, as the development of the *aureus* – whose intrinsic value remained relatively stable – was finally decoupled from the dramatic debasement of silver, nominal exchange rates between gold and silver coins are likely to have come under growing pressure. Unfortunately, the evidence sheds little light on actual outcomes in most parts of the Roman world. In Egypt, prices appear to have remained fairly stable throughout this period but suddenly rose more than tenfold in the mid-270s CE when the imperial government officially re-tariffed the imperial silver coinage in ways that appear to have caused it to be conspicuously overvalued relative to existing standards. A similar link between official re-tariffing and sudden price inflation has been suggested for 301 CE when the state doubled the nominal value of silver and billon coins relative to gold: price controls that were – unsuccessfully – imposed immediately afterwards may have been an attempt to curtail an ensuing or anticipated rise in prices.²⁷⁸

This suggests a complex reality in which both official valuations and the metal value of coins were of relevance and sudden government intervention was the principal cause of the market’s refusal to accept certain types of coin at face value.²⁷⁹ Just as in the Qin state of the third century BCE had sought to assign a uniform value to coins of different weights (see above, section 2), the Roman authorities expected to determine the rates at which state-manufactured coins were to be exchanged regardless of their precise physical properties. Roman jurists repeatedly emphasized the interchangeability of individual coins, the character of any (Roman,

²⁷⁴ Duncan-Jones 1994: 227.

²⁷⁵ The data surveyed in Duncan-Jones 1994: 25-9 and Rathbone forthcoming cannot tell us about conditions outside Egypt (on which see below). Modern estimates of the increase in legionary base pay between the 80s and the 230s CE mostly suggest a rate of 500 percent (e.g., Wolters 1999: 224; Herz 2007: 313; but cf. Rathbone 2007 for the overall degree of uncertainty): given that a 200 per cent increase would have matched the concurrent debasement of the imperial silver currency, an aggregate raise on that scale implies a substantial increase in real terms regardless of whether prices tracked coin debasement.

²⁷⁶ Debasement: Harl 1996: 142. Prices: Rathbone 1997.

²⁷⁷ Harl 1996: 130.

²⁷⁸ See, e.g., Howgego 1995: 131-3; Rathbone 1997; Strobel 2002: 139-44. These measures are only poorly understood and continue to be debated; pertinent scholarship is much more substantial than can be indicated here.

²⁷⁹ Howgego 1995: 115-40 remains the most valuable discussion of the underlying complexities.

though not foreign) coin as the embodiment of a given value or price (*pretium*) and not as a commodity (*merx*), and the expectation that the value of Roman coins was a function of their number as opposed to their actual weight.²⁸⁰ Within the empire, the market tolerated slow downward trends in coin weight and fineness in the sense that prices do not appear to have immediately responded to each incremental reduction of intrinsic value. At the same time, the gradual disappearance of the lowest-value denominations of bronze coins from the second century CE onward is consistent with the notion of creeping price inflation. Moreover, changes in the composition of Roman coin hoards have been interpreted as a sign that during the accelerating debasement of the silver currency in the first half of the third century CE, users preferred to hoard coins with a higher intrinsic value and thus attached significance to the growing divergence of nominal and metal value.²⁸¹

The resilience of the imperial currency system may have owed much to the enormous size of the Roman empire that trapped most coin users within a single system of exchange dominated by state-manufactured coin or its local surrogates. In this monopolistic environment, the lack of competition in the form of alternative monetary media or monetary inflows from the outside tended to stifle market responses to currency debasement. It need not be by coincidence that the structure of Roman coin finds from beyond the borders – in India and later also Germany – seems to reflect greater sensitivity to changes in precious-metal content.²⁸² The mature Han constituted a similarly self-contained system of currency exchange.

In the final analysis, the Roman currency system was not any more “metallistic” than the Han system was “fiduciary,” or vice versa. Both monetary regimes combined an appreciation of intrinsic value with varying degrees of tolerance of long-term debasement. In both empires, known incidents of widespread loss of trust in the official coinage tended to be closely associated with bold measures that dissociated nominal values from prevailing standards: experiments with various kinds of large-denomination token coins in China (see above) and monetary reforms in the late third and early fourth centuries CE in Rome. While the state generally benefited from its monopoly status in the monetary sphere that enabled it to increase revenue through gradual debasement without undermining the currency,²⁸³ the sheer scale of its dominance also magnified the consequences of more ambitious state intervention.

²⁸⁰ Paulus, *Digest* 18.1.1 is a key text. For discussion of the sources, see esp. Wolters 1999: 356-62; Strobel 2002: 115-8.

²⁸¹ Wolters 1999: 379-81, but cf. Strobel 2002: 96-111. Critical awareness of government policy is also reflected in a contemporary historian’s complaint that the emperor Caracalla had issued debased coin (Cassius Dio 78.14.3-4).

²⁸² See esp. Wolters 1999: 381-94. This may also explain the more overtly “metallistic” character of later European currencies that operated in a competitive market.

²⁸³ The numismatic data suggest that both the Roman and the Han economies were capable of accommodating gradual debasement: a weight loss of 25-30 percent for *wuzhu* coins between the early 110s BCE and the second century CE; an 18 per cent reduction of the gold content of the aureus between the early first century and the 230s CE; and the 56 percent debasement of the *denarius* in the same period (see above). It is unfortunate that we do not know whether the rapid debasement of the Roman bronze *as* in the late third century BCE – by 85 percent between 218 and 213 BCE (see above, section 6.1) – was accompanied by corresponding price inflation (cf. Rathbone 1993: 124-5).

9. Monetization

9.1. Money stocks

Did the preponderance of base-metal coins in Han China result in lower levels of (metal-based) monetization than in the precious-metal-rich Roman empire?²⁸⁴ According to the *Hanshu*, the Han state issued more than 28 billion *wuzhu* coins between 112 BCE and the end of the Western Han dynasty, at an average rate of 230 million per year. The credibility of this figure is reinforced by later references to the annual production of 327 million bronze coins at one point in the Tang period and corresponding tallies of 800 million to 1.3 billion in the first century of the Northern Song period.²⁸⁵

It is unclear to what extent pre-*wuzhu* issues were still in use at the end of the Western Han period or later: while it seems unlikely that *banliang* issues from the early Han or even Qin periods had completely disappeared from circulation, there is no good reason to believe that they accounted for a large part of the total money stock.²⁸⁶ Only a detailed analysis of all known coin hoards from the Han period could shed some light on this issue. Moreover, the stock of *wuzhu* coins was exposed to attrition through loss and other forms of wastage. Although the scale of this process defies quantification, the loss of *wuzhu* coins and the continuing use of earlier issues would have pushed the total volume of the money stock in opposite directions, to some unknown degree canceling each other out. A few thought experiments help us demarcate the limits of the plausible. Modern sources report annual rates of loss of 0.7 to 1 percent for low-value base-metal coins (pennies) in early twentieth-century Britain whereas estimated wastage rates for precious-metal coins in earlier periods vary dramatically from 0.125 to 7.7 (!) percent.²⁸⁷ At an annual rate of loss of 0.7 percent and schematically assuming constant annual minting rates, one-third of the 28 billion *wuzhu* coins would already have disappeared by the beginning of the first century CE. If, say, 10 billion Han *banliang* coins had been produced prior to the 110s BCE – at one-half of the subsequent mean annual production rate –, two-thirds of them would already have disappeared by the end of the Western Han period if the annual rate of wastage was as high as that, creating a total “hybrid” stock of 22 billion coins. By comparison, if we assume a lower annual loss rate of 0.3 percent and – probably unrealistically – double the size of the pre-*wuzhu* Han money stock, we end up with an early-first-century CE tally of 23 billion *wuzhu* and 12 billion earlier coins, for a total of 35 billion. This suggests that it would difficult to reckon with a total money stock of either below 20 billion or much over 30 billion bronze coins at the end of the Western Han period. If pre-*wuzhu* coin had been successfully demonetized, our estimate would have to be near the lower end of this range.

The amount of gold and silver that was used for monetary purposes is of course unknown. As discussed above, references to the disbursement of 900,000 *jin* – or *c.*225 tons of gold if all of this did indeed consist of actual gold – in the Western Han period and to Wang Mang’s hoard of 600,000 *jin* or *c.*150 tons of gold are of uncertain value and in any case cannot

²⁸⁴ Just as coins are only one form of money (see above, section 1), “monetization” cannot be reduced to changes in the volume or circulation of coin. Unfortunately, I am not aware of a specific term for what might be labeled “metal-based” or “metalliform” monetization, that is, the extent to which coins and bullion were used as money in a given economic system. As before, in this section I focus primarily on the use of coin but also touch briefly on the role of other monetary media. A detailed assessment of the importance of coin use relative to the use of other monetary instruments is well beyond the scope of this survey.

²⁸⁵ *Hanshu* 24B: 19b; von Glahn 1996: 49-50.

²⁸⁶ It is telling the only first-century CE hoard that contained monetary objects from the Warring States period reported by Peng 2000: 207-8 was located outside the Han empire proper.

²⁸⁷ Duncan-Jones 2004: 204 n.40 with references.

be used to estimate total gold stocks at the time.²⁸⁸ The relative scarcity of gold hoards from the Han period suggests that in the most general terms, monetary gold stocks were smaller than in the Roman empire. If we were to speculate that the amount of Han gold money was half as large as that of Roman coined gold, the resultant total of 220-440 tons might have been priced at anywhere from 9 to 37 billion cash.²⁸⁹ It merits attention that higher estimates of the quantity of gold money would imply that gold rather than bronze dominated the Han currency system, which seems incompatible with the tenor of the sources as well as evidence from later periods of Chinese history. Given the very low profile of silver in the Western Han period, this metal would not have made a significant contribution to the money supply.

These crude conjectures suggest that the aggregate cash value of all gold, silver, and bronze money at the end of the Western Han period could have ranged from 30 to 70 billion cash. Given that both the high-end guesses of the number of bronze coins and the amount of gold money rest on assumptions that are likely to inflate the results, an actual tally of the order of 40 or 50 billion seems more plausible.²⁹⁰ Converted into grain equivalent, metal money stocks of 30 to 70 billion cash may have corresponded to anywhere from 6 to 28 billion liters of grain while the conservative estimate of 40 to 50 billion cash would have translated to 8 to 20 billion liters.²⁹¹

Drawing on estimates of coin output under particular rulers and allowing for wastage, Richard Duncan-Jones sought to extrapolate the total amount of precious metal in circulation in the Roman empire in the 160s CE. His conjectural calculations indicate the existence of a coined money stock of approximately 900 tons of gold and 5,800 tons of silver. Adding base-metal issues, the total cash value of all coins would have amounted to roughly 20 billion sesterces.²⁹² Expressed in grain equivalent, this corresponds to some 45 to 90 billion liters.²⁹³ However, although Duncan-Jones believed that Roman liquidity levels were generally low, comparative evidence shows that the size of the money stock implied by his own estimate is actually very high by historical standards: it approximates the probable annual GDP of the empire as a whole, whereas the money supply of the more economically developed Dutch Republic in the late

²⁸⁸ See above, section 4.2. See also n.***.

²⁸⁹ For Roman totals, see in the text below. Possible gold prices range from 10,000 cash per *jin* (at Wang Mang's official rate) to about 21,000: see above, section 4.2.

²⁹⁰ It is unlikely that pre-*wuzhu* coins accounted for a large share of all coins in circulation and that Chinese gold stocks were as high as 400-500 tons: for the latter, see in the text below. 20 to 25 billion bronze coins and 200-300 tons of gold at 20,000 cash per *jin* would yield a total of 36 to 49 billion cash. For the use of non-metallic token money, see below.

²⁹¹ Han grain prices are poorly known. The conventional conversion rate of 100 cash per *hu* (19.9 liters) of grain (Bielenstein 1980: 126) in the Eastern Han period may refer to elevated prices in the capital. Comparative data from early modern China show that grain prices in outlying regions were only half or two-thirds as high as in central areas: e.g., Wang 1991: 46. Thus, Han grain prices may have ranged from 50 to 100 cash per *hu*. An intermediate figure would seem to provide the most plausible notional average and is consistent with estimates of average grain prices of 30-80 or 70-80 cash per *hu* in the Western Han period (Hsu 1980: 79; Yang 1961: 154 n.47) and the fact that grain prices of between 67 and 110 cash per *hu* are repeatedly recorded in the Juyan garrison documents (Wang 2004: 59). See also Peng 1994: 164-9.

²⁹² Duncan-Jones 1994: 168-70.

²⁹³ Rathbone forthcoming is the most recent survey of grain prices in the Roman world, referring to grain prices of 2-2.25 sesterces per *modius* (8.62 liters) in parts of the eastern Mediterranean in the first and second centuries CE. Prices were higher in Italy, especially in the city of Rome: see Duncan-Jones 1982: 346, 365; Rathbone 1996: 217-22 and forthcoming. I have chosen a range from 2 to 4 sesterces per *modius* whose upper limit probably overstates *average* grain prices and thereby understates the purchasing power of Roman money (and hence the degree of monetization) in order to make it more difficult to me to make a case that the Roman world was more monetized than Han China. 2 to 3 sesterces per *modius* might be a more reasonable mean for the Roman empire as a whole.

eighteenth century has been estimated at less than its annual GNP.²⁹⁴ The numismatic foundations of Duncan-Jones's extrapolations are also liable to criticism.²⁹⁵ For these reasons we have to allow for the possibility that Roman imperial money stocks were significantly smaller than suggested. At the same time, convergent reports concerning the considerable annual output of gold and silver mints in the Roman period speak against the notion of much more modest overall stocks: in principle, cumulative yields of a dozen tons of gold and several dozen tons of silver per year would have been sufficient to build up large stocks of precious metal on the scale envisioned by Duncan-Jones.²⁹⁶ Moreover, money stocks that were large in relation to GDP do not necessarily translate to high levels of liquidity as long as hoarding immobilizes a large share of the available assets, which may well have occurred in the Roman empire. A compromise estimate of total money stocks worth between 10 and 20 billion sesterces would translate to anywhere from 22 to 90 billion liters of grain.

Due to the deficiencies of the evidence, my estimates for size of both the Han and the Roman money stocks vary by a factor of four or five. However, despite these very considerable margins of uncertainty, even the broadest range of guesses for the money stock in Han China of between 6 and 28 billion liters of grain equivalent barely overlaps with the much higher range from 22 to 90 billion liters proposed for the Roman empire. More conservative guesses of 8 to 20 billion liters for Han China and of 30 to 40 billion liters for the Roman empire would have even less in common.²⁹⁷ With all due caution, I conclude that due to the dominance of gold and silver coin in western Eurasia and in light of the documented valuation of different metals relative to grain in both regions, the Roman empire had achieved higher levels of monetization than its Chinese counterpart.

This conclusion rests on a comparison of metal stocks and their real value expressed in terms of grain. However, non-metallic monetary media likewise require consideration. In the Han empire, cash and bullion were supplemented by money in the form of textiles, above all silk. The first known normed unit was the *bu* of the late pre-imperial Qin state, a piece of cloth measuring 8 *chi* by 2 *chi* 5 *cun* (or 188 x 58.5cm) and valued at 11 *banliang* cash. References to fines that are expressed in multiples of the latter figure – such as 110, 220, 1,100, or 2,200 cash – suggest that these payments may have been collected in cloth rather than coin.²⁹⁸ Under the Han dynasty, bolts of 2 *chi* 2 *cun* by 5 *zhang* (51.7 x 1,175cm) became the standard size. Silk remained a popular gift throughout that period, and the monetary use of textiles generally surged during periods of state instability such as the later years of Wang Mang's reign, or later on in the Jin Dynasty, the Period of Disunion, or the late Tang Dynasty.²⁹⁹ In addition, payments in the form

²⁹⁴ Duncan-Jones 1994: 32 (“liquidity was generally low”). For Roman GDP, see Friesen and Scheidel forthcoming. The comparison with the Netherlands was made by Jongman 2003: 187, with reference to De Vries and Van der Woude 1997: 88-91.

²⁹⁵ I am indebted to William Metcalf for information on work in progress. Some modern estimates for late Roman gold stocks are much lower: see Depeyrot 1991: 212 (59 tons on gold in 310 CE, 200 tons in 370 CE, 95 tons in 490 CE).

²⁹⁶ See above, section 7.2. These textual claims are consistent with physical evidence in the form of lead deposits in Arctic ice cores that were caused by Roman silver-smelting: see most recently de Callataÿ 2005. However, outflows of gold and silver coins would have helped to offset gains from mining: see esp. Turner 1989 and also Wolters 1999: 389-93 for surveys of the monetary dimension of Roman trade with India.

²⁹⁷ For the former, see above. The latter estimate reckons with a relatively small money stock worth 10 billion sesterces and a more realistic empire-wide mean grain price of 2 to 3 sesterces per *modius* (cf. above, n.***).

²⁹⁸ E.g., Hulsewé 1985b: 227-9; Thierry 1997: 170; Wang 2004: 14.

²⁹⁹ See briefly Wang 2004: 14 with references, and Peng 1994 *passim* (esp. 209, on the Han period) for more detail.

of “salary-silk” (*luyongbo*) and “salary-cotton” (*lubu*) are mentioned in the documents from the Juyan garrison site.³⁰⁰

We cannot tell how much the monetary use of textiles contributed to the overall money supply. However, it is crucial to realize that for cloth money to close the gap between the money stocks of the Han and Roman empires, it would have had to be as abundant (in cash terms) as all varieties of metal money combined.³⁰¹ The sources certainly do not convey the impression that this was the case in times of stability such as much of the Western Han period. Thus, while non-metallic monetary media must have helped to shore up the Chinese money supply, it is highly unlikely that they would have offset the underlying imbalances in metal stocks between eastern and western Eurasia.³⁰²

Moreover, the Roman money supply was also boosted by non-metallic means of payment. Recent scholarship has emphasized the considerable role of credit money in the Roman economy, especially for large-scale transactions in elite circles and for long-distance trade.³⁰³ The nature of comparable arrangements in the Han empire remains obscure. In the Tang and Song periods, shortages of bronze coin caused deflationary price decreases that had to be offset by the introduction of monetary remittances and account notes. These innovations expanded the money supply well beyond monetary metal stocks. However, comparable arrangements are not recorded for any period of Chinese history prior to the Tang dynasty.³⁰⁴ Money remittances called “flying cash” (*fei qian*) or, later, “convenient exchange” (*bian huan*) first appeared around 800 CE.³⁰⁵ Paper money can be traced back only as far as the tenth century CE.³⁰⁶ Thus, in so far as Han merchants and bankers made use of credit money, there is no good reason to assume that they did so on a much grander scale than their Roman counterparts. The use of non-metallic monetary media does not affect my overall conclusion that levels of monetization – in both gross and per capita terms – in the Roman empire at its peak significantly exceeded those in the equivalent period of the Han empire.

9.2. Money use

As already mentioned, the volume of the money supply does not tell us much about liquidity per se. A better idea of how much coin circulated can be obtained by comparing my above estimates to budgetary requirements. In the case of Han China, surviving documents from

³⁰⁰ Wang 2004: 51 with 50 table 6, and cf. 51 table 7 for the issuing of *dahuangbu* or “large yellow cloth” in 11 CE.

³⁰¹ The above estimate of Han metal money stocks worth 6 to 28 billion liters of grain would need to be doubled in order to overlap substantially with the Roman estimate of 22 to 90 billion liters.

³⁰² Although grain was also used as a means of payment in Han China (see, e.g., Bielenstein 1980: 125-31 for the salaries of state officials and Wang 2004: 51 for practices in a frontier context), the information contained Donghai Commandery archive suggests that such transactions cannot have accounted for more than a small fraction of government spending (see above). We do not know enough about practices in the private sector.

³⁰³ See Mrozek 1985 and now esp. Harris 2006.

³⁰⁴ We cannot rule out the possibility that the merchants of the Han period operated private credit systems that have left no trace in the aristocratic (and usually anti-merchant) sources, but it seems unlikely that they could have been sufficiently substantial to compensate for the relative scarcity of metal money.

³⁰⁵ Peng 1994: 329-31, esp. 330 n.3. Cf. De Ligt 2003 for a comparative perspective, and Adshead 2004: 68-100 for the increasing sophistication of the Tang economy. Carlson 2006 compares traditions of money-lending in the Roman and Han empires. For a survey of the rudimentary credit institutions of the Han period, see Peng 1994: 183-5. The Juyan texts record deferred payments and debts but no more sophisticated arrangements: Wang 2004: 53-4.

³⁰⁶ Peng 1994: 367-9. Cf. Elvin 1973: 146-63.

an official archive of Donghai Commandery that date from around 10 BCE provide unique insight into the workings of the fiscal system. One of these texts reports the presence of 1.4 million residents in 266,000 households who in a given year had provided the government with an annual revenue of 267 million cash and 507,000 *shih* (10 million liters) of grain.³⁰⁷ Given that Donghai Commandery accounted for approximately one-fortieth of the imperial population at the time and that it might be considered a reasonable “average” province in the sense that it was neither located in the capital region or the highly developed old core of the central Great Plain nor particularly peripheral either, and therefore arguably not entirely unrepresentative in terms of its overall economic development, a simple extrapolation from the reported revenue points to annual imperial gross income of about 10 to 11 billion cash and 400 million liters of grain worth another 1 or 2 billion cash. As I will argue in greater detail elsewhere, a number of indicators support the notion of an annual imperial budget of the order of 10 to 15 billion cash or cash equivalent.³⁰⁸

Unless conditions in Donghai Commandery were highly anomalous, a large proportion of these funds were remitted in cash rather than in kind.³⁰⁹ Cash payments of 10 billion per year would have required the mobilization of anywhere from 30 to 50 percent of all existing bronze coins. We cannot tell whether and to what extent gold could be substituted for cash: however, the sources do not report the payment of tax in gold beyond a relatively small levy on top-level aristocrats (see above, section 4.2). Even if one-third of all revenues had been obtained in the form of precious metal, 20 or probably closer to 30 percent of all bronze coins would have had to change hands every year to satisfy state demands. It appears that the circulation of assets between the state and its subjects was a key function of Han coinage.

Two competing models of the monetary system of the Northern Song period help put this estimate into perspective. In the eleventh century CE, according to Miyazawa Tomoyuki’s model of “fiscal circulation” which considers the imperial bronze currency above all as a medium for state savings and payments, each year about one-quarter of the coined money stock was used for tax payments, one-tenth for commercial exchange, and most of the remainder was hoarded by the government. By contrast, Gao Congming’s more market-oriented model envisions annual tax payments equivalent to one-sixth of the total money stock, commercial exchange on a much grander scale (closer to one-half), and smaller state savings (perhaps one-seventh).³¹⁰ While the latter scenario may be better supported for the Song period itself, the Han data place the early imperial monetary system in closer proximity to Miyazawa’s reconstruction. Reported government savings of 8.3 billion cash in the second half of the first century BCE would probably have accounted for no more than one-sixth or one-fifth of the overall money stock including precious metals, or 30 to 40 percent of all coin, implying an intermediate scenario in between Miyazawa’s and Gao’s more extreme positions.³¹¹ Then again, Wudi’s supposed ability to disburse some 200 tons of gold or its cash equivalent in a short period of time and the purported scale of Wang Mang’s gold hoard would once again seem to be far better consistent with Miyazawa’s perspective (see above, section 4.2). These issues warrant further consideration. What matters here is that these reconstructions show that there is nothing inherently implausible about the notion that the annual tax revenues of the Han state may have represented a very sizeable portion of the total money stock.

³⁰⁷ Loewe 2004: 60 (YM6D1). For 1-2 CE, *Hanshu* 19A: 28b reports 1.56 million people in 358,000 households. I have rounded off all these figures.

³⁰⁸ Scheidel forthcoming b.

³⁰⁹ See above. Payment of the poll tax in kind is portrayed as an emergency relief measure in *Hanshu* 7:7b and 7:10a: see Hsu 1980: 240-1. This also implies that cash payments were considered the norm. Cf. also Loewe 1985: 256 n.39. However, we cannot rule out the possibility that some of the “cash” revenue reported in the Donghai document had actually been remitted in the form of gold, silver, or cloth but that the accountants employed “cash” as a universal unit of account for all these pecuniary assets.

³¹⁰ Miyazawa 1998 and Gao 1999 as discussed by von Glahn 2004.

³¹¹ Nishijima 1986: 594.

Recent estimates of the Roman imperial budget in the middle of the second century CE converge on approximately 1 billion sesterces.³¹² It is certain that not all of these funds were collected in cash.³¹³ However, if we employ the simplifying assumption of an annual revenue stream of 1 billion sesterces in coin, this amount would not have exceeded 10 percent of the coined money stock. Allowing for assessments in kind and/or a coinage volume in excess of 10 billion sesterces (see above) –, its actual share was probably smaller still.

In terms of grain equivalent, the annual revenues of the Han empire in the late first century BCE and the Roman empire of the mid-second century CE appear to have been roughly similar: 2 to 6 billion liters in the former and 2 to 4.5 billion (figures which increased soon thereafter and to which we must add municipal taxes, which lacked a Han equivalent) in the latter. Given similar levels of technological development and similarly sized populations, this match is perfectly plausible. At the same time, unless my above estimates of total metal stocks are very wide of the mark, the Roman empire was significantly more monetized than the Han state and more coin was therefore available for commercial exchange or hoarding. In view of the dramatic surge of Mediterranean trade and production for a mass market in the Roman period and the growing wealth of the Roman elite that does not seem to have been matched by that of its Han peers, both commerce and elite hoarding may well have been sufficiently important to absorb the larger stock of coinage in the Roman empire.³¹⁴ This raises important questions about the character of the Han and Roman economies that go well beyond the scope of this survey and call for more systematic investigation.³¹⁵

³¹² Compare Duncan-Jones 1994: 33-46, esp. 45 (between 832 and 983 million sesterces c.150 CE) and Wolters 1999: 202-34, esp. 223 (implying a total of c.1.1 billion in the same period).

³¹³ Duncan-Jones 1990: 187-98.

³¹⁴ On the expansion of trade under Roman rule, see most recently Morley 2007: 90-102. In the Han empire, in the absence of significant maritime trade and the massive north-south canal network that helped shape later periods of Chinese history, the overall volume of supra-local exchange may well have fallen short of Roman levels. In Han historiography, “100 million cash” served as a proverbial figure denoting a very large fortune. This translates to 20-40 million liters of grain or anywhere from 5 to 18 (or probably rather 14) million sesterces. In second-century CE Rome, by contrast, an aristocratic fortune of 20 million sesterces would not have placed the owner among the super-rich, as the grandest estates were (imagined to be?) fifteen or twenty times as large: see Duncan-Jones 1982: 17-32, 343-4. See Jongman 2006: 248 for a minimum estimate of aggregate Roman imperial elite wealth of 13 billion sesterces and the likelihood of a much higher actual total, accounting for a very sizeable share of all assets in the empire. Cf. also Friesen and Scheidel forthcoming. Although, as I point out in Chapter 1, the ideal-typical contrast between Rome as an empire of property-holders and China as an empire of office-holders (Wood 2003: 26-37) is overdrawn, it nevertheless contains a kernel of truth.

³¹⁵ Morris forthcoming constructs a long-term historical index of social development that uses coded data for energy capture, organizational capacity, information processing, and war-making abilities as proxies of overall macro-regional development. He finds that in these respects, western Eurasia in the Roman period enjoyed a noticeable lead over eastern Eurasia in the Han period.

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