Integration and the Regional Market System in the Early Chinese Empires: A Case Study of the Distribution of Iron and Bronze Objects in the Wei River Valley

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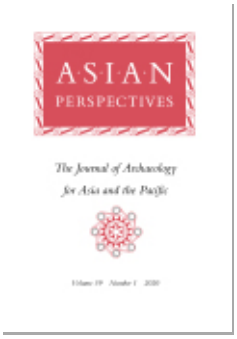

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ABSTRACT

This article studies the economic structure of early Chinese empires (Qin and Western Han) by focusing on the contribution of market exchange to the distribution and transportation of metal goods. Emphasis is placed on the part played by market forces in integrating and connecting communities on a regional level, an issue that has not been comprehensively addressed in the literature but was essential to market exchange in ancient China. A tripartite framework is proposed for conceptualizing three forms of market exchange or regional integration: dendritic, administrative-integrated, and fully integrated. These models may also be applied to the study of interregional interaction. An analysis of distribution patterns of everyday iron and bronze items from burial contexts within the capital region (Wei river valley) of the Qin and Western Han empires reveals a major shift in the development of the market system and sub-regional integration between the Qin and Western Han periods. The change in degree of integration shows that the region went from a more dendritic to a fully-integrated model, though one still dominated by major administrative centers (especially Chang'an). The new approach for investigating market exchange used in this article offers a framework through which the structuring principles of ancient markets, forces driving change in market systems, and underlying mechanisms of administrative control over the movement of material culture can all be explored in the context of ancient China. The discussion of integration at a regional level sheds new light on the market system during the formation of massive, unified, early Chinese empires. Keywords: market exchange, integration, distribution pattern, ancient iron and bronze industries, funerary practices, Qin and Han empires.

INTRODUCTION

Market exchange is one of the key concepts to have attracted significant attention in the archaeological literature (Garraty and Stark 2010; Hirth and Pillsbury 2013; King 2015). By definition, market exchange refers to "transactions where the forces of supply and demand are visible and where prices or exchange equivalencies exist" (Pryor 1977:32). This type of exchange can occur in various ways, including exchange

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at a centralized location (also known as marketplace exchange) and exchange in decentralized places (e.g., barter exchange) (Hirth 1998:455). Since the movement of goods from production centers to consumers of various ranks through the market mechanism widely distributes daily goods (Feinman and Garraty 2010:171; Hirth 1998:451), the development of the market system and its relationship to state infrastructure have often been considered key structuring principles for understanding ancient economies (e.g., see Roman market exchange discussed in Temin 2013).

During early imperial China, including the Warring States (453–221 B.C.), Qin unification (221–206 B.C.), and Han (202 B.C.–A.D. 220) periods, market exchange gradually came to occupy an essential role in the imperial finance system (von Glahn 2016:95–97; Zhang Jihai 2006). In particular, starting in 117 B.C., the Han empire implemented monopoly policies to control the manufacturing and selling of two types of important daily materials—iron and salt—due to the need to expand income sources to cope with the financial crisis caused by a series of military campaigns (Nishijima 1986). Economic texts compiled from the Warring States, Qin, and Han periods, including the *Guanzi Jiaozhu* compiled approximately around the first century B.C. and the *Yantielun Jiaozhu* compiled during Emperor Xuan's time (73–49 B.C.), extensively discussed issues relating to the market economy such as regional variation in the availability of different resources, economic principles based on quantitative calculations (Chin 2015:32–34; Guanzi Jiaozhu 2009, ch. 81–85), and problems of the state-monopolized market system (Yantielun Jiaozhu 1992, "Shuikan 水旱 [Floods and Droughts]" 36:429–430). Archaeological records dating to these periods clearly indicate the existence of market exchange, including evidence of coinage systems (Emura 2011; Kakinuma 2011) and long-distance trade products such as lacquerware and bronzes (Barbieri-Low 2007:118, 125, 137; Hong 2006:218–221; Wu 2007); market transactions were also depicted in artistic representations of the times (Liu Zhiyuan 1973) (see discussions in Bang 2009; Gao 2008:108–112; Hsu 2006:143–146; Huang 2003; Scheidel 2009, 2015; von Glahn 2016:151–154; Zhang Jihai 2006:222–225).

Unfortunately, ancient texts and these lines of archaeological evidence often only provide brief macroscalar narratives about the mechanisms of market exchange. How daily commodities were transported between settlements of various scale and what role the distribution of such goods via various levels of the market system played in organizing the economic foundations of early Chinese empires has yet to be clarified through empirical study. Unlike later historical periods, in which rich textual materials allow the investigation of marketplace distribution (i.e., how different markets were distributed across a region) and even how regional cultural traditions were shaped by market behaviors (Han 2017; Skinner 1964, 1965*a*, 1965*b*), textual records at similar resolution are lacking for the Qin-Han period. The archaeological exploration of market exchange through a study of mundane commodities can enhance our knowledge of markets in early imperial China by providing more concrete evidence than that explored in previous literature which relies primarily upon textual sources.

Given that the definition and identification of "market exchange" is a hotly debated topic in archaeological studies (Feinman and Nicholas 2010), this article first discusses the nature of markets in the context of ancient empires. Since I argue that "regional integration" is a key consideration for conceptualizing market exchange, I aim to identify the kinds of archaeological evidence that would be relevant to investigating integration. In the following, "integration" refers to degrees of interaction that have

been stimulated by the movement of goods primarily via marketplaces, that is, centers or institutions in which market transactions take place. Three models are presented that simulate different degrees of market integration: *dendritic*, *administrative-integrated*, and *fully integrated*. This case study of the distribution patterns of iron and bronze objects (two major types of commodities in the Qin-Han period) from burial contexts demonstrates how these models could be used to shed light on the evolution of political economies and regional connections within the capital region of the Western Han and Qin empires.[1] The key finding that the Han empire was characterized by a high level of commercialization and economic integration in the capital region, whereas the Qin period was characterized by a more dendritic pattern of integration, might provide a useful basis for further studying the processes of interregional exchange and economic foundations of early Chinese empires.

CONCEPTUALIZING MARKET EXCHANGE AND MODELING REGIONAL INTEGRATION IN ANCIENT EMPIRES

Multiple Scale of Market Exchange in the Study of Ancient Economies

In recent decades, the study of "embeddedness" and social relationships involved in market economies in other disciplines (Lie 1997; Plattner 1989; Swedberg 1994) has led to a growing body of archaeological scholarship refocused on the role of market exchange as a structuring principle in ancient economies (Hirth and Pillsbury 2013; Morris and Manning 2005). Even though markets existed far more widely in ancient economies than has previously been portrayed (Finley 1999:84; Polanyi 1957:255–257;Polanyi 2001:45, 49, 69), recent studies have come to recognize that pre-industrial market exchange was often hindered by various technological constraints relating to goods transportation and the communication of information (Morley 2014). As a result, ancient markets usually operated without some of the fundamental features that have only appeared in modern, industrial settings, including market systems well-integrated into settlements of varying scale, large-scale divisions of labor, extensive trading networks, and a fast spread of information over long distances. Instead of serving as overarching mechanisms in themselves, it seems more accurate to consider past market behaviors as constituting a type of transaction that was often embedded within or operated in parallel with other forms of economic exchange (e.g., redistribution, the movement of surplus to central financial institutional apparatuses of power [Earle 2011:238]) and related political involvements (cf. Roman period examples in Bang 2008; Hitchner 2005; Mattingly 2006; Millett 2001).

In this vein, I agree with Michael Smith (2004:75) that a productive archaeological investigation of market exchange must shift the paradigm beyond viewing the issue of the existence of markets as a simple question of their presence or absence in the past. Instead of focusing exclusively on concepts such as market exchange and redistribution as means of characterizing ancient economies (e.g., Silver 1984), a more critical approach should address the question of how market transactions in the past operated as a process for generating different degrees of economic integration in any given socio-political unit. Building on this idea, the framework of "multi-layer integration" of ancient economies, as conceptualized by Roman historians Alan Bowman and Andrew Wilson (2009:24–27), can be a helpful tool through which the dichotomy between ancient versus modern economies can be transcended and the role of the market in ancient settings can be more meaningfully described.

Given that past societies were technologically limited, this framework proposes to study ancient market systems by differentiating and clarifying the degree of integration generated by market transactions in terms of three spatial scales: local (or sub-regional), regional, and interregional (across the regions of an entire empire). Following the definition usually adopted by archaeologists to address regional settlement patterns (Fish and Kowalewski 1990), this framework conceptualizes a "region" as an independent geographical unit, which may include various topographic zones bounded by certain geomorphological features such as river valleys or mountains, and which has been described as having distinctive cultural traditions in historical documents (such as the *Hanshu* [1997, 40:2032–2033] and *Shiji* [1997, 129:3261] for China). Since the distribution of daily goods in the past was very likely a combined effect of various exchange mechanisms, not solely market exchange, from each of these levels or scales, studying the degree of integration using material culture should make it possible to clarify how ancient markets served to integrate cities with county and village towns and thereby provide a practical approach for articulating the economic structure of early empires.

Having explored some fundamental issues relating to ancient market exchange, this study reorients the discussion by presenting a framework for evaluating the regional economic structure of the Wei river valley in Shaanxi Province during the Warring States, Qin unification, and Han periods; this region is also known as the Guanzhong basin (Wang Z. 2003). Of the three levels of integration identified above, the regional market is perhaps the most critical, inasmuch as it facilitated long-distance exchange and provided necessities to local communities at lower-level centers. In previous discussions of ancient markets in China, however, the regional aspect appears to be the least clear when compared with interregional and sub-regional levels of exchange. Researchers have already documented the complex interregional exchange system of goods (bronze vessels, mirrors, and lacquerware) that operated across different parts of the Han empire (Barbieri-Low 2007:118, 125, 137). Associated inscriptions on some of these items such as mirrors demonstrate that they were clearly circulated as marketable commodities (Guo 2018). Previous studies have also suggested that periodic marketplaces, controlled by the state via taxes and merchant census registration, were already common in sub-regional settlements by the Eastern Han period at the latest (Gao 2008:110; Zhang Jihai 2006:237–250). Permanent marketplaces were also plentiful in the capital center. For instance, ancient texts such as the *Sanfu Huangtu Jiaoshi* (2005, "Chang'an jiushi 長安九市 [Nine markets in Chang'an]" 2:93) mention that at least nine marketplaces were operating in Chang'an, the capital of the Western Han empire. By contrast, intermediate-scale (i.e., regional) integration, which is concerned with the mechanisms by which major centers or market systems were integrated within a specific region and the extent to which the state was involved in the transportation process, has not been comprehensively investigated for the Han period even though archaeological evidence published in recent decades provides more than enough data for understanding this fundamental aspect of imperial economies. Part of the problem is that no framework yet exists that is capable of piecing the various lines of archaeological evidence together to understand the market system at a regional scale in ancient China. To mitigate this difficulty, I propose three models for conceptualizing different forms of regional scale market exchange that occurred in the early imperial period.

Framing Regional Integration in Market Exchange

Several key approaches to exploring the intraregional exchange of daily commodities using various archaeological indicators have been proposed in archaeological literature about other regions (e.g., the New World) in recent decades (Blanton 1996; Braswell 2010; Brumfiel 1980; Dahlin et al. 2007; Dahlin et al. 2010; Hirth 1998; Nichols et al. 2002; Shaw 2012; Smith 1978; for summary, see Garraty 2010). Among these previous attempts, Kenneth Hirth's (1998) "household distribution approach" provides a broadly applicable framework for understanding market exchange beyond a particular case study region. This approach examines the frequencies of exchanged goods and homogeneity of assemblages from households of different rank. According to Hirth (1998:455), the force of market exchange allows customers of different rank to gain access to the same assemblage of goods because products flow primarily through independent economic channels rather than hierarchical political networks. As a result, market exchange tends to generate a distinctive distribution pattern of goods, with a homogeneous assemblage of goods being found among all households in a small area regardless of their differentiation by economic status.

Previous studies employing the "distributional approach" in Mesoamerican archaeology have demonstrated its value for understanding market exchange at a relatively small spatial scale, such as when archaeologists are concentrating on features within a site or site-cluster (Garraty 2009; Hirth 1998, 2013). However, when addressing the question of market exchange at a regional level involving relatively large areas (i.e., the Wei river valley in China), I argue that another well-established approach should be combined with this one, namely Colin Renfrew's (1975, 1977) "fall-off distribution" approach. Renfrew suggests that the spatial fall-off patterns in abundance of goods with distance from source may demonstrate the existence of various forms of exchange (especially market exchange) across a large regional landscape. These two approaches can be used in concert by replacing households with settlements of different ranks (e.g., capital city and minor centers). Once production or major transportation centers have been identified, if the assemblages of certain types of objects in centers of different ranks are relatively similar or their relative frequencies give no clear indication of monotonic depletion from the production center to peripheries, then the pattern might indicate a developed market system is operating to influence the distribution of goods. ("Monotonic depletion" refers to the frequency of occurrence declining with distance from the source [Renfrew 1977:72–73].) Accordingly, the study of spatial fall-off patterns in conjunction with the distributional approach appears to be a crucial methodological step towards addressing regional integration.

However, as mentioned before, the form and degree of integration in market exchange are never static. In order to employ Hirth's distribution approach, my proposed framework must first define different forms of market systems. For this purpose, Carol Smith's heuristic models (1976*a*, 1976*b*), which have already inspired some archaeological case studies (e.g., Minc 2006), will be summarized here. First, the market system can be differentiated into two basic types, as "normal" and "abnormal;" these two types manifest very distinctively in terms of intervention by administrative forces, transportation efficiency, and means by which goods were transported (Smith 1976*a*:28, 33–39). The normal market system refers to the scenario in which settlements and market centers are organized according to the so-called "market principle in a central-place system," within which lower ranking centers or markets

usually exist in conjunction with two or more higher ranking centers in order to facilitate distribution and reduce costs (Christaller 1966:72; Smith 1976*a*:20–21, Smith 1976*b*:8). By contrast, an abnormal market system, also called a "dendritic system," transports goods through limited or even single paths that connect higher with lower rank centers (Kelley 1976; Smith 1976*a*:34–36). In the latter case, market places remote from major centers are under-developed and constructed primarily for the sake of administrative control rather than economic considerations. Goods produced at high-level or administrative centers could only be transported downstream to lower level locales through a less-developed exchange network.

Here it must be recognized that significant differences in terms of economic and political settings existed between the Han empire and the case studies from which the above models were derived; this needs to be taken into account when considering the past realities of Han society. Moreover, some of these models, including Carol Smith's study of two types of markets, were proposed several decades ago. In recent literature, Richard Blanton (2013) has suggested employing a more comprehensive "cooperation approach" to investigating broader social factors beyond the local and personal levels of interaction (e.g., genealogy, intermarriage) that are involved in market development. Nonetheless, the investigation of fall-off distribution patterns of goods and their correlation with hierarchies provides one fundamental way for assessing archaeological evidence for regional integration and state control over market exchange. Despite various contraints, these three frameworks (i.e., household-distribution, fall-off distribution, and normal/abnormal market) can be combined as a basic theoretical tool for investigating the mechanisms underlying the distribution of goods, which were barely mentioned in Han period texts.

By combining the distributional approach with discussions about market forms, I propose three hypothetical market models: dendritic, administrative-integrated, and fully integrated. Table 1 compares their features, while Figure 1 provides schematic diagrams for each of the three models. Since the regional core (i.e., capital) during the early imperial period often played a key role in both the production and distribution of commodities, these models can be employed to evaluate the degree of integration of regional and lower-level centers at different distances from the capital (i.e., with varying degrees of peripherality) and assess the extent to which marketplace exchange was present in these locations. Based on these models, I envision that the assemblage of goods and frequency of tombs yielding goods in different places will vary primarily depending upon the intensity of market connection and interaction with administrative control (Table 1). Although social status could to a certain extent impact access to goods and the composition of assemblages, we might still be able to draw valid conclusions from the variability identified in a statistical study of commoners' tombs with a large sample size from different settlements. If the sample size of tombs is large enough, I argue that variations in the frequencies of tombs yielding goods between different locations should represent at least three ideal types of market systems. These variations can be juxtaposed against a continuum of market control, with developed marketplaces only concentrated in major centers on the one hand, and relatively free distribution among centers of various ranks (due to widespread distribution of marketplaces) on the other. Below I elaborate on each of the models.

The first is called a "dendritic" model. It exists where a major administrative center dominates the overall production or distribution of most everyday commodities. In this case, although markets might be well developed at the main center (e.g., the capital in

Table 1. Types of Market Exchange and Indicators for Three Exchange Models

	DENDRITIC MODEL	ADMINISTRATIVE-INTEGRATED MODEL	FULLY-INTEGRATED MODEL
Exchange in the capital	Capital dominates production and transaction	Capital dominates production and transaction	Capital may not dominate production and transaction; goods more evenly distributed outside capital
Exchange in centers outside the capital	Goods produced in capital consumed locally; goods manufactured at capital cannot be distributed to peripheral major or minor centers	Exchange between capital and major centers, especially those closer to the capital, increasingly active and frequent; distribution pattern not entirely monotonic depletion	Goods manufactured in capital easily distributed to major and minor centers
Expectation for assemblages in archaeological record	Assemblages in capital sharply distinguished from lower-rank centers; most commodities found in capital; frequencies of capital types very low in lower-rank centers	Assemblages in capital and nearby major centers more homogeneous; frequencies in major centers less likely to show monotonic depletion; sharp difference in the frequencies of artifacts between capital and lower-ranking, peripheral centers	Assemblages in capital, major, and minor centers more homogenous; frequencies of same types of commodities in capital or major centers not always higher than in lower-rank or peripheral centers

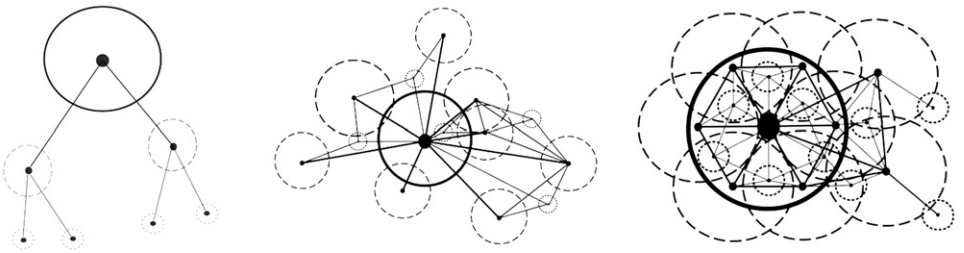

Fig. 1. Schematics for three models: dendritic (left); administrative-integrated (center); fully-integrated (right). Key: circle drawn with solid black line represents the market area covered by the capital (largest solid black dot at center of the circle); circles drawn with dashed lines represent market areas covered by administrative centers (black dots) other than the capital; medium size dots represent major (first-rank) centers; small dots represent lower or second-rank centers; straight lines between solid black dots represent market connections between centers. (Redrawn from Minc 2006: fig. 1; Smith 1976: fig. 4.)

the region), regional marketplace exchange via a network between the capital and other lower ranked centers is relatively underdeveloped. This hinders the transportation of goods from the main center or capital to other consumption sites. Because the movement of goods is central to the institutional apparatus of power at the capital in some cases, the capital in the region might dominate the manufacture of all craft products or the procurement of final products from outside. The transportation of goods from production centers located in the capital to the majority of consumers across the region is relatively inefficient. The lack of a well-integrated market system outside of the capital severely impacts the transportation of goods, leading to assemblages of goods in the capital that are dramatically different from those in all lower-rank centers. For instance, the collection of certain types of goods found in the capital may be very rare in lower-ranking centers. In addition, frequencies of objects may be significantly higher in the capital because that is where resources are concentrated. When all these factors are combined, the volume of commodities in lower ranked centers stand in sharp contrast to the pattern revealed in the capital.

The second type is called an "administrative-integrated market" model. In this case, perhaps due to a greater density of marketplaces in a region or an improved level of connectivity between marketplaces, the market system is relatively well-developed in major or first-rank centers at some distance away from the capital. As a consequence, the differences in frequencies of objects and assemblage compositions with distance from the core are less pronounced. Either the regional network is more evenly developed or administrative forces serve to accelerate the supply of goods only between capitals and relatively minor or second-rank centers. The difference between capitals and other first-rank centers in terms of the accessibility to goods might be less pronounced than in the dendritic model, while the discrepancy between the capital and lower-rank centers still persists. This exchange system inevitably contributes to the formation of more homogeneous goods assemblages in first-rank centers outside the capital.[2] Nonetheless, consumers in the capital, regardless of their social status, might have greater access to items within a given assemblage of goods offered by a particular manufacturing or redistribution center. As a result, the frequencies of goods in major centers would still be relatively higher than in second-rank centers.

The third model is a "fully-integrated market" system, in which second-rank centers are much better connected with one another and with the capital than is suggested by the other two models. This reflects the form of market exchange that has usually been conceptualized and discussed in previous studies, where the better connections between centers significantly counterbalance the limitations of transportation costs and technology (Garraty 2009; Hirth 1998). Also, the exchange of goods primarily follows the economic or transportation principle, whereby goods are allocated to customers who demand the items (Smith 1976*a*:19–20). Because of a well-developed market network, residents throughout the region can generally access the same assemblage of products, whether they live in the capital or in distant, second-rank centers. The result would be a relatively homogeneous assemblage of goods in the archaeological record. In other words, the assemblage of commodities in the same kind of archaeological units (e.g., households, cemeteries) within centers of different levels would include similar types of objects. Within a large region, the frequencies of certain types of objects might still vary between different centers due to transportation costs or communication barriers, but neither capitals nor major (first-rank) centers would reveal a higher percentage or frequency of types of goods.

By proposing the models discussed above in order to evaluate structural variability in market systems, this framework, in effect, tries to move the study of pre-capitalist markets away from a focus on the existence of a main determining mechanism. With this issue in mind, the study's framework is designed to investigate the accessibility of goods, or consumption patterns, in settlements of different levels and at varying distances from the regional core center or capital. By using the Wei river valley as a case study to examine the distribution of iron and bronze objects across settlements of different ranks, I attempt to show how the above models can be used to reveal regional exchange and explain the operations of the market system and its structuring principles within the context of Early Imperial China.

QIN–HAN ECONOMIC SYSTEMS AND THE MANUFACTURE–DISTRIBUTION OF BRONZE AND IRON IMPLEMENTS IN THE WEI RIVER VALLEY

This case study focuses on the investigation of regional exchange within the Wei river valley in Shaanxi (Fig. 2), which was the capital region of the Qin and Han empires. The geomorphologically defined study region is bounded by the loess plateau to the north and the Qinling mountains to the south (Wang Z. 2003). Because of its geographical uniqueness, this important region served as the political headquarters for more than 600 years (from the seventh century B.C.to first century A.D.) for the Qin state, the Qin empire after unification, and eventually for the Western Han empire. During the Han period, the capital Chang'an was acknowledged in the *Shiji* (129:3261) to be a convergence point for commercial networks extending to all parts of the empire. An imperial communication infrastructure, including canals and roads, was constructed by Qin and Han authorities in order to facilitate transportation of goods from Chang'an or Xianyang to other territories (Nylan 2012, 2015; Sanft 2014; Xin 1988). Through such projects, these two empires were able to successfully concentrate resources from distant area into the region of their headquarters.[3] In addition to its political and economic significance, the Wei river valley area had the highest population in the entire Han state during the Western Han period (Ge 1990), a situation which was initiated by the Western Han imperial authorities relocating many

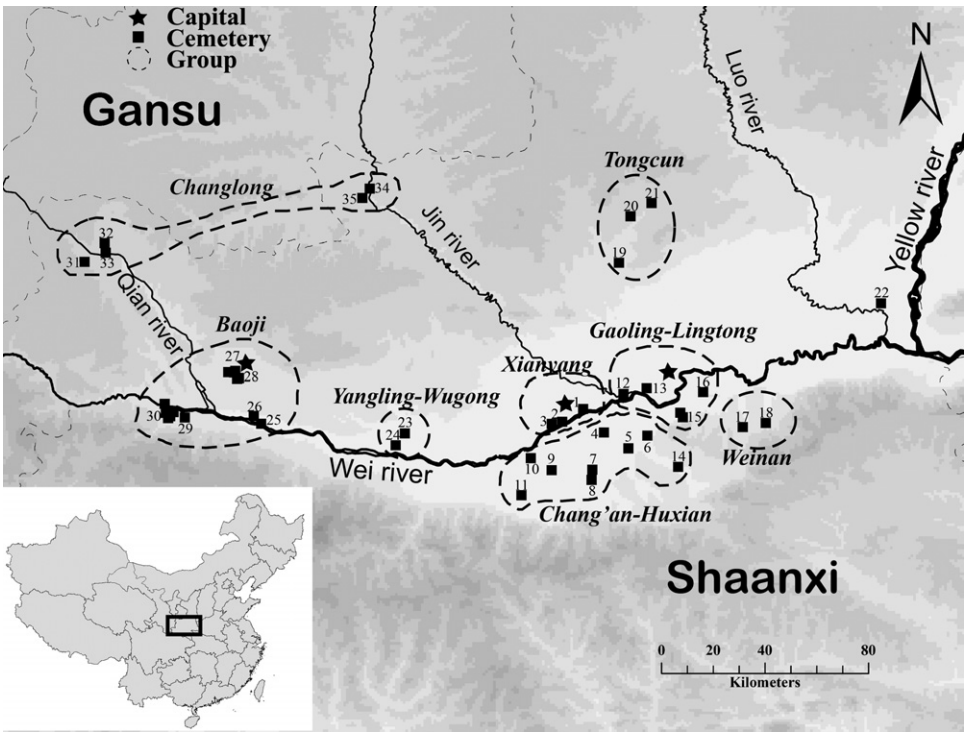

Fig. 2. Map of Warring States cemeteries of the Qin State in the Guanzhong basin, including parts of cemeteries dating to the Spring and Autumn and Qin unification periods. Sources: (1) Shaanxisheng 2004*b*; (2) Xianyangshi Wenwu 2005; (3) Xianyangshi Wenwu 1998; (4) Shaanxisheng 2006*c*; Shaanxisheng Yanjiuyuan 2008; (5) Jin 1957; (6) Zhang Z. 1959; (7) Wang J. 1994; (8) Xi'anshi 2004*b*; (9) Zhongguo Kexueyuan 1962; (10) Shaanxisheng and Wenguanhui 1975; (11) Cao 1989; (12) Shaanxisheng 2003*b*; (13) Shaanxisheng 2004*a*; (14) Zhongguo Shehui Shaanxi 1988; (15) Qinyong 1980; Shihuangling 1983; (16) Shaanxisheng 1998*b*; (17) Shaanxisheng Yanjiuyuan and Weinanshi 2011; (18) Shaanxisheng and Qinshihuang 2006; (19) Ma 1959; (20) Shaanxisheng 1986; (21) Shaanxisheng and Beijing 1987; (22) Shaanxisheng and Dalixian 1978; (23) Gao and Zao 1996; Xianyangshi Wenguankui 1992; Xianyangshi Wenwu 1996; (24) Zhongguo Shehui Wugong 1996; (25) Shaanxisheng Wenwu 1965; (26) Baojishi and Baojixian 1980; (27) Shaanxisheng Gongzuozhan 1991; Shaanxisheng et al. 2013; Yongcheng 1985; (28) Shaanxisheng Yongcheng 1980, 1986; Shang and Zhao 1986; Yongcheng 1980; Yongcheng 1986; (29) Su 1984; (30) Baojishi 1991; Baojishi and Baojishi 1979; Tian and Lei 1993; Zhao and Liu 1963; (31) Baojishi and Longxian 2001; (32) Gao and Wang 1988; (33) Shaanxisheng 1998*a*; (34) Shaanxisheng 1984; (35) Zhongguo Shehui 2007.

influential families (especially those of powerful merchants) to settlements surrounding Chang'an. Given that such a large population was associated with a high demand for commodities, market exchange in the region should provide an important dimension for evaluating the economic foundations of the Qin and Han empires.

A critical economic transformation might have occurred during the Qin and Han periods, which should be borne in mind when attempting to explain differences in the archaeological record. As historian Emura Haruki (1995, 2011) has noted, the Qin state appeared to lag behind other states during the Warring States period in terms of its overall market or commercial development; formal markets were only established there by Duke Xian around 378 B.C. (*Shiji* 6:289). As reported in the *Shangjunshu Zhuyi*

(1974, "Kenling 墾令 [Order to Cultivate Waste Lands]" 2:21), the Lord Shang reforms dating from 358 and 350 B.C.also laid down a significant foundation for Qin unification by advocating agricultural development at the cost of depressing commercial activities. Nevertheless, excavated texts such as the *Shuihudi*'s "Jinbulv 金布律 [Statutes on currency]" (Hulsewe 1985:53, A46; Shuihudi 1990:136) have shown that the local Qin government during the unification period became actively engaged in selling or buying goods via the market and imposed strict standardized orders for managing market activities, census data, accountancy, and tax collection (Barbieri-Low and Yates 2015:721; Loewe 2006, 2010). In addition, evidence from ceramic inscriptions in Guanzhong shows that "commodity branding" and "privately-owned workshops" might have emerged in the Qin-Han period (Yuan 1987:61–63). Previously, some scholars have even proposed that the term "commodity economy" should be employed as a theoretical scheme for illustrating and describing the overaching economic system of the Qin and Han states (He 2001; Utsunomiya 1967). However, when these contradictory data are viewed together, it is unclear how and when a large-scale, regional market system was able to emerge in the Qin state, which was thought to have economically lagged behind other states in its earlier stages. This raises some questions concerning the extent to which the Qin state's market system was capable of integrating communities of various ranks within the same region. Moreover, it is as yet unclear whether the role played by market exchange in structuring the imperial economy was different in the Qin and Han empires. Unfortunately, these issues have never been scrutinized at the regional level. Archaeological data from Guanzhong is therefore used to illuminate and hopefully clarify this essential aspect of the economic structure of early empires in China.

Despite the fact that archaeological discoveries from the Qin and Han periods in the Wei river valley have been rapidly accumulating in recent decades, very little progress has been made beyond reports focused on burials. Residential areas of commoners were significantly under-represented in the dataset. Given such constraints, burial goods represented the only available data for investigation. I propose that bronze and iron objects within the assemblages of goods from burial contexts can serve as an important proxy or indicator of the market system, as most of them were portable items that became key commodities largely consumed by commoners (Kageyama 1984; Lam et al. 2017; Wagner 2008:84). Although bronze objects embodied political symbols in the Shang-Zhou period, bronze belt-hooks and other types of bronze objects (i.e., coins, mirrors, digging tools, and knives) were already being manufactured on a massive scale and have been found in tombs representing various social ranks, indicating they already were open to consumption by commoners and had become "commodities" by the Warring States period. Also, around the time of the transition to the Warring States period, cast iron technology emerged as an alternative to bronze and began to be employed in the large-scale manufacturing of agricultural tools (Bai 2005:116; Lam 2014; Lam et al. 2017; Wagner 2008:140). Ancient texts in the Han period also clearly suggest that iron tools, particularly agricultural implements, were commodities circulated through market exchange (Yantielun Jiaozhu 1992, "Shuikan" 36:429). In other words, the distribution patterns of the majority of bronze and iron objects selected for this case study could to a large extent be attributed to the market systems of the Qin-Han period.

It must be noted that, although most commoners could access metal products, the production of both bronze and iron was largely controlled by these states, especially

after the implementation of the salt-iron monopoly in the Western Han dynasty in 117 B.C. Besides the manufacturing process, the Qin-Han state also managed sales of these objects, probably by maintaining prices and controlling the quality of objects sold in marketplaces at settlements of various ranks (Gao 2008). The involvement of the state in manufacturing, transporting, and distributing products would unavoidably skew the distribution of commodities away from standard "marketplace exchange" determined purely by demand and supply. Whether or not the production and transportation of bronze and iron objects was entirely subsidized by the state, the distribution of commodities to commoners in settlements of various rank still had to rely upon a regional market network that permitted transaction and the movement of goods beyond the political core. An empirical investigation of distribution patterns is therefore the first step for articulating the operation of regional market exchange and its relationship with the state.

As Feinman and other scholars have noted, the issue of equifinality relating to post-depositional issues must be of concern in the archaeological study of markets (Feinman and Nicholas 2010; Smith 1999, 2010).[4] Equifinality is relevant to this case study because the assemblage data for iron objects might be somewhat skewed by natural post-depositional processes. Many of the iron objects recovered from tombs are badly preserved and heavily corroded. As a consequence, the original forms of these objects are often unrecognizable and site reports just label them in general as "iron ware." In contrast, bronze objects are often much better preserved than iron in the same environmental context.[5] Although certain bronze objects such as bronze weapons and chariot fittings were to a certain extent related to rank, other items in the assemblage such as mirrors, belt-hooks, and coffin decorations were not used exclusively by high status members of society. For this reason, I suggest that bronze and iron objects should be examined together in order to better understand the distribution patterns of each object type. Since the Guanzhong basin area is generally considered to present a similar cultural tradition to that in evidence in other regions, and residents there followed similar cultural practices, it is unlikely that certain types of metal objects predominantly appeared only in a small area because of a unique local tradition. If a market system indeed existed and contributed to the distribution of mundane metal goods, then the types of bronzes that were less closely related to status (i.e., mirrors) will perhaps better reveal an underlying market distribution pattern.

In order to employ the above models to study the distribution patterns of iron and bronze objects, the origins of raw materials and manufacturing places of final products must first be known. Unfortunately, these two issues have not yet been comprehensively studied in the literature. So far, very few bronze and iron objects in the region have been systematically subjected to metallurgical analyses (e.g., Liu 1999). More importantly, previous metallurgical studies of iron objects excavated from the region demonstrated that the two most-commonly found materials were cast iron and steel decarburized from a solid stage of cast iron; very few slag inclusions from ores were included in most objects, which hinders provenance analyses (Lam et al. 2018). In other words, no conclusive evidence is available from the literature and published data to confirm ore sources or the exact manufacturing locations of the bronze and iron objects from Guanzhong.

Even though direct evidence is missing, archaeological discoveries of production sites, relevant textual evidence, and geological surveys collectively offer hints and indirect evidence for the provenance of metal objects from the capital region that I discuss below. According to modern geological surveys, large-scale iron deposits were

particularly lacking within the Wei river valley, but some iron ores were reported in the Qinling mountains to the south and on the margins of the Guanzhong basin (e.g., in present-day Hancheng) (Zhongguo Kuangcang 1996). After its initial development during the Spring and Autumn period (770–454 B.C.), the iron industry appeared to rapidly expand and iron objects have frequently been found in grave-goods assemblages dating to after the Warring States period (Lam et al. 2017). Large-scale cast iron manufacturing remains dating to the Qin period have been identified in the capital area at Xianyang (Shaanxisheng 2004*b*), but no systematic excavation has been conducted at the site. In other local centers such as Yongchang, evidence of iron production has hitherto not been reported. Since no long-distance transportation of iron objects between different Warring States polities were reported in any textual records, it seems reasonable to assume that the capital area (Xianyang) was one potential manufacturing center for iron items found in the region during the Warring States-Qin period, although the ore sources remain unclear.

In the Han period, evidence of iron production has been found in the northwestern corner of Chang'an (Bai 2011; Zhongguo Shehui 1995, 1997) and occasionally in some lower-rank centers such as Yangling and Yongchang (Qin 1980; Shaanxisheng Yanjiuyuan 2018). Having said that, the size and production scale of these local ironworks are generally very small in comparison with contemporary ironworks in the eastern part of the empire (Lam et al. 2018). Also, excavation of these sites have shown that only chariot-fittings and limited types of agricultural tools were manufactured at such small ironworks. Any local demand for iron vessels or other implements could not have been met by the production capacity of the ironworks that have thus far been identified (Lam et al. 2018; Lam et al. 2015). In contrast to the small-scale iron production sites in the Wei river valley, the Han dynasty is well-known for having established huge iron foundries in iron-rich regions, such as in Henan Commandery after the implementation of the iron monopoly. The cross-regional transportation of iron objects is confirmed in inscriptions of iron offices on implements manufactured by state-controlled ironworks (Li 2000). Although no conclusive evidence has been found in the Guanzhong basin, one likely scenario is that the majority of the iron daily goods, including vessels and raw materials such as the iron bars (made of steel decarburized from a solid stage of cast iron) used for forging, consumed in the capital could at least in some cases have been imported from large-scale production centers outside the Wei river valley. Meanwhile, none of the small-scale ironworks within the Wei river valley could reasonably be considered as the primary manufacturing center for the region or even nearby towns (Lam et al. 2018). These local production centers in the capital region were probably set up to supplement output and reduce the cost of transportation through recycling scrap iron to make iron agricultural tools for local residents.

Textual and archaeological remains show that the production system of the bronze industry was somewhat similar to the one producing iron. As was seen with iron ores, modern geological surveys have shown that no large copper mines were located within the Wei river valley (Zhongguo Kuangcang 1996). Archaeometallurgical studies have indicated that the Qin state might have exploited copper resources in the Qinling mountains in the eastern part of Gansu (Jia 2011). Bronze manufacturing remains dating to the Warring States period have been found in Xianyang (Shaanxisheng 2004*b*) and Yongcheng (Tian 2013), indicating that bronze objects were likely to have been locally manufactured in more than one center. Bronze manufacturing sites dating to the Western Han period have also been found surrounding the capital, including in

the northwestern corner of Chang'an (Zhongguo Shehui 1995) and in the Shanglinyuan royal garden (Xi'an 2004). The surveys and excavations of these sites indicate that they were used primarily for minting coins, while no remains associated with the production of bronze daily goods such as mirrors and weapons have been found. The best archaeological evidence for the production of bronze mirrors, which are the most common type of bronze artifact found in burial assemblages, was found in Lingzi in present-day Shangdong (Bai and Shimizu 2007; Yang et al. 2013). Studies of textual records of bronze weapons (crossbows) and vessels show that these items were primarily manufactured in the Henan Commandery in present-day Henan Province (Liu and Zhang 2006) and the Shu Commandery in present-day Sichuan Province (Bai 2014; Wu 2007, 2014). In other words, the majority of bronze and iron items found in tombs in the Wei river valley was probably shipped into the capital region using an imperial transportation network (including the Cao canal) that connected the capital to other parts of the empire and on to other lower-level settlements within the region (Zhang Jianfeng 2016).

The information presented above suggests that the production and transportation systems of metal objects within the Wei river valley may well have undergone a significant shift in the Qin and Han periods. In the Warring States-Qin period, the majority of iron and bronze objects discovered in the Wei river valley were likely to have been manufactured locally. In contrast, most types of bronze and iron daily items discovered for the Western Han period were probably imported from workshops outside the Wei river valley. Because of the transportation infrastructure linking the capital region to other production centers, Chang'an might therefore have served as both a manufacturing and redistribution center for various final products or raw material. Even though it remains debatable if the iron and bronze industries of these periods were entirely controlled by the empires, the capital region of the Qin-Han state provides an important opportunity for applying the framework described above to examining the mechanism for distributing metal goods and if it changed in parallel with a major transformation in the political and production system.

SAMPLE SELECTION AND DATA PROCESSING FOR STATISTICAL ANALYSIS

In order to interpret changes to the exchange and distribution patterns in the Wei river valley, this case study collected published Qin burial data from Guanzhong (Table 2; Fig. 2) and from Western Han tombs of middle to lower rank from the same region (Table 3; Fig. 3), for a combined sample total of more than 3000 tombs (published before 2016). Although conventional studies divide the entire chronology of the Western Han into three phases (Han and Zhang 2011), the volume of published data in some areas is much lower for some phases and the parts that have been published are highly selective and biased. Furthermore, these cemeteries were usually partially excavated and only tombs that were relatively well-preserved or contained rich assemblages of goods are mentioned in publication. Because some areas lack sufficient samples to permit analysis within a fine chronological framework, I discuss the percentages of Western Han tombs as a whole that came from the same area or same cemeteries. High-status tombs such as those with bronze ritual vessels were removed from the dataset to limit the effect of social status on the data.[6]

Qin period burials were mostly shaft-pit tombs or catacomb tombs of similar size. In the Han period, brick-chamber tombs with a short entry ramp became more popular

Table 2. Tombs Found at Eight Burial Groups Dating to the Warring States–Qin Period

AREA	NUMBER OF TOMBS
Baoji	106
Chang'an-Huxian (Chang-Hu)	391
Changlong	148
Gaoling-Lingtong (Gao-Ling)	26
Tongcun	7
Weinan	52
Xianyang	272
Yangling-Wugong (Yang-Wu)	16
Total	870

Table 3. Numbers of Tombs Found in Nine Burial Groups Dating to the Western Han Period

AREA	NUMBER OF TOMBS
Baoji	35
Chang'an	1041
Fufeng	22
Gao-Ling	30
Longxian	39
Meixian	45
Weinan	19
Xianyang	27
Yangling	306
Total	1564

and gradually replaced the earlier types (Han and Zhang 2011). Some of the Han burials took the form of a pair of joined brick-chamber tombs, but very few of them had long entry ramps or chambers larger than 10 × 10 m. It is important to note that the traditional social hierarchy that had developed in the Bronze Age was no longer reflected in the burial practices of the Qin state following the Lord Shang reforms (ca. 358–350 B.C.) (Shelach and Pines 2006; Teng 2002, 2013; von Falkenhausen 2004). These medium and small-sized tombs might therefore represent people from a wide spectrum of society, although most low-status bound-servants or slaves are still unlikely to be represented here as they usually did not have typical tombs that are recognizable in the archaeological record. Thus, it can reasonably be argued that the frequency and distribution of goods found in the graves selected for this study reflects their availability to commoners of middle ranking social status, rather than their availability to all members of society.

To calculate the fall-off pattern, I divided the Qin period burial dataset into several spatial clusters or 'groups' based on the location of tombs and the proximity of

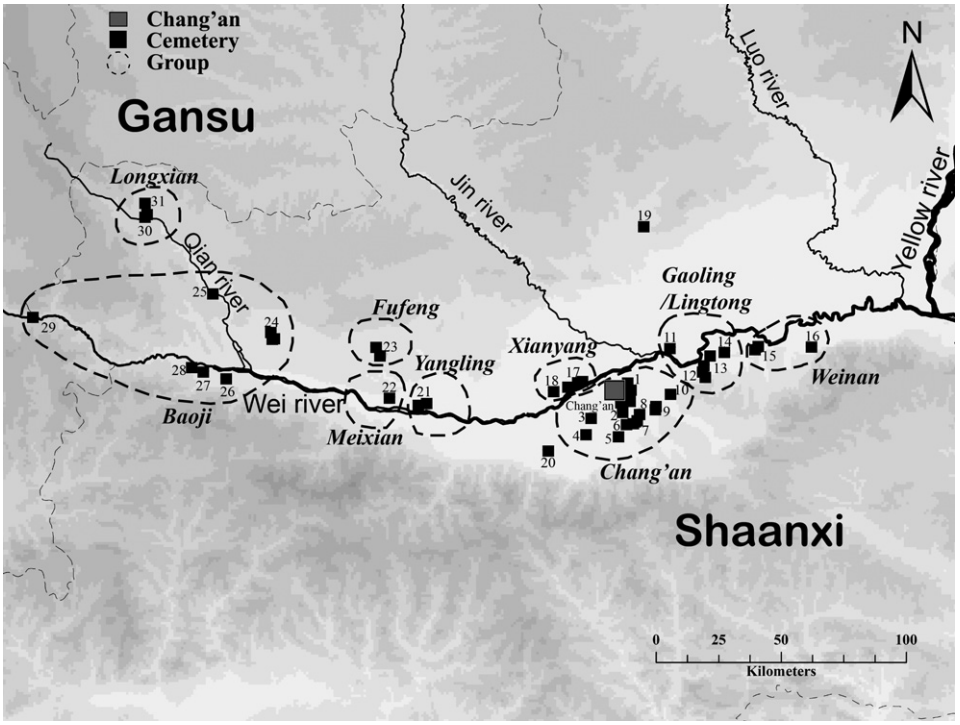

Fig. 3. Map of Western Han cemeteries in the Guanzhong basin. Sources: (1) Cheng et al. 1992*a*, 1992*b*; Han and Cheng 1991, 1992; Shaanxisheng 1987, 2003*c*, 2006*b*; Sun and Chong 2001; Wang and Kong 1987; Xi'anshi 1997*a*, 1998, 1999; Xi'anshi and Zhengzhou 2004; Zhongguo Shehui Tangchengdui 1991; (2) Xi'anshi 1997*b*; (3) Xi'anshi and Zhengzhou 2004; (4) Xi'anshi 2009; (5) Shaanxisheng 2001; (6) Xi'anshi and Zhengzhou 2004; (7) Xi'anshi and Zhengzhou 2004; (8) Xi'anshi 2004*a*; (9) Shaanxisheng 2003*a*; (10) Zhang Z. 1959; (11) Shaanxisheng 2004*a*; (12) Shaanxisheng Paihe 1989; Wang X. 2004; (13) Yang Qihuang, pers. comm. July 2013; (14) Shaanxisheng 2004*c*; (15) Cui 1992; Cui and Wang 1998; (16) Xibei 1989; (17) Xianyang 1986; Xianyangshi Wenwu 1999, 2004, 2006; (18) Xianyangshi Wenwu 2000; (19) Ma 1959; (20) Gao 1980; (21) Gao and Zao 1996; Shaanxisheng Yanjiuyuan and Yanglingqu 2018; Xianyangshi Wenwu 1996; (22) Shaanxisheng and Baojishi 1989; (23) Shaanxisheng Yanjiuyuan 2010; Zhouyuan 2001; (24) Shaanxisheng Yongcheng 1980, 1986; Shaanxisheng et al. 2013; Shang and Zhao 1986; (25) Wang G. 1975; (26) Shaanxisheng Yanjiuyuan and Baojishi 2013; (27) Zhang T. 1987; (28) Shaanxisheng Yanjiuyuan and Baojishi 2012; (29) Shaanxisheng 2006*a*; (30) Baojishi 2002; Shaanxisheng Baozhong 1999; (31) Tian and Yang 1998.

cemeteries to the capital (Fig. 2). These divisions are not entirely congruent with the administrative divisions promulgated by the Qin empire, and are therefore somewhat subjective. Also, given the nature of the data, the size of each group is not identical, and the numbers of modern city or county covered by each group varies greatly. For the same reasons, the group divisions for the Han period are somewhat different from that of the Qin dynasty in terms of the geographical coverage of each group and the number of groups (Fig. 3). These divisions were created in an attempt to provide relatively comparable groups for purposes of statistical analysis.

This article aims to use the framework proposed above to evaluate if the patterning of objects buried or discarded in tombs in different groups was contingent upon another crucial factor: the hierarchy of settlements. This study ranks each group as

either the capital city (main or core center), first-rank (major centers slightly inferior to the capital but superior to other centers), or second-rank (minor centers inferior to the capital and first-rank centers) based on the hierarchy of major settlements included in each of these groups. Historical texts combined with archaeological data provide valuable evidence for determining the rank of settlements (Table 4). For the Warring States period, I classified Chang'an-Huxian (Chang-Hu) and Baoji as first-rank settlements. Since several major palace complexes were located in the Chang'an area, and it may have been part of the Xianyagn capital at the time, the political importance of Chang-Hu should be relatively higher than other groups. Also, since Yong, a key site in Baoji, was a ritual center where the inauguration ceremony for the First Emperor was said to have taken place (*Shiji* 6:227), the group of Baoji should be important in terms of its political role. For the Western Han period, according to the "Zhilv 秩律 [Book of Salaries]" document unearthed from Zhangjiashan (Barbieri-Low and Yates 2015:964; Zhangjiashan 2001:193), county magistrates were classified into three ranks relative to the political importance of the counties they governed (Xiao 2007). I assume that the highest ranked counties, known as the 1000-bushel (*shi*)-rank magistrate-counties, were more important, at least politically, than other counties in the Han empire (Table 5). Thus, the Gaoling-Lingtong (Gao-Ling) group is classified as first-rank because it includes two counties (Xinfeng and Yueyang) where magistrates held a salary grade of 1000 bushels; Baoji also belongs to the first-rank category because Yong

Table 4. Ranking of Various Burial Groups during Warring States-Qin Period

CENTER	RANK
Xianyang	Capital
Baoji	First-rank
Chang-Hu	First-rank
Changlong	Second-rank
Gao-Ling	Second-rank
Tongchun	Second-rank
Weinan	Second-rank
Yang-Wu	Second-rank

Table 5. Ranking of Burial Groups at Various Centers during the Western Han Period

CENTER	RANK
Chang'an	Capital
Baoji	First rank
Gao-Ling	First-rank
Xianyang	First-rank
Fufeng	Second-rank
Longxian	Second-rank
Meixian	Second-rank
Weinan	Second-rank
Yangling	Second-rank

county magistrates had the same salary grade. Xianyang is considered first-rank because most mausoleum towns, which were set up by the Han government to relocate rich and influential families that migrated from the east, are located there (Ge 1990).

In order to more effectively limit the potential impact of individual economic status on the statistical study below, I only calculate the frequency of occurrence of certain types of iron and bronze items. Although the exact quantity of each type of iron and bronze object in each tomb is assumed contingent upon the level of integration of market exchange in the settlement, it also might be influenced by the social status of the occupant of the tomb. Wealthy occupants were more likely than other people to have metal objects buried with them. Therefore, this study only takes into consideration the presence or absence of iron and bronze objects, rather than their quantities, and instead uses the frequency of burials containing certain types of bronze or iron objects as a major proxy for studying the market system and availability of daily commodities to the general population.

To facilitate the discussion, I grouped similar types of objects into generic categories such as iron or bronze knives and bronze or iron belt-hooks. Since this study is attempting to calculate the frequency of iron and bronze objects in order to understand the regional homogeneity of assemblages, objects such as iron scissors that appeared only occasionally were collected into broader generic groups such as "iron tools." For the purpose of comparison, the following section only considers the major types that appear in most clusters, including belt-hooks, knives, and swords. If a generic group appeared in just two or three clusters with a frequency of below 5 percent, then items in this group were not included in the statistical study because of their low distribution range.[7]

Each cluster usually included no more than 6 or 7 types of commonly-found bronze or iron objects. The frequencies of occurrence of each type was compared in order to reconstruct distribution patterns. For the final analysis, I aggregated all the iron or bronze items into the general categories of "iron objects" or "bronze objects" in order to more clearly illustrate the distribution patterns produced when the percentage of metal objects is plotted against a site's proximity to the capital.

THE DISTRIBUTION OF IRON COMMODITIES

During the Qin and Han periods, the types of iron objects found in tombs included knives and belt-hooks (Bai 2005; Lam et al. 2017). Iron tools such as spades have occasionally been found, but they seem to have been discarded in tomb backfill instead of placed in coffins as burial goods. With few exceptions, iron weapons such as swords, spears, and arrow-heads have not been found in the studied assemblages.[8] Other iron objects included vessels and lamp-stands, but they were primarily found in tombs dating to the Late Warring States period or later. In comparison with the Han period, iron cauldrons, vessels in general, and long swords are rarely found in Qin tombs; their numbers are not high enough to be included in the assemblage list for this study of distribution patterns (Bai 2005; Teng 1993, 1995).

The bar graph in Figure 4 shows that the various types of iron artifacts are relatively few in number and very rare in most lower-rank centers such as Changlong, making the assemblages in Qin tombs at the capital (Xianyang) different from other centers across the entire Wei river valley. Other phenomena should also be noted in the frequency data. First, in Xianyang, the capital of the Qin state after 300 B.C., about 9.5

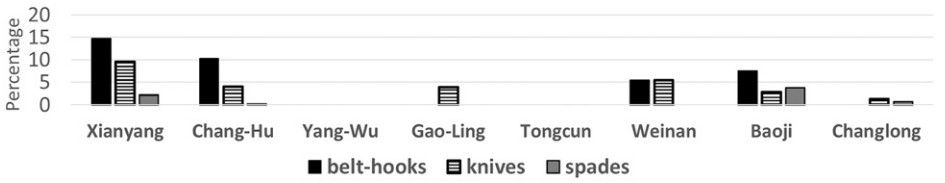

Fig. 4. Percentage of tombs containing iron items in eight burial groups in Guanzhong from the Warring States through Qin periods.

percent of tombs included iron knives and about 15 percent of tombs yielded at least one iron belt-hook (Fig. 4). Second, inter-site comparisons show that the percentages of iron belt-hooks and knives in Xianyang and Chang-Hu (including Chang'an) are relatively higher than those in Yangling-Wugong (Yang-Wu), Changlong, Gao-Ling, Weinan, and Baoji. Due to its proximity to Xianyang, Chang'an had already assumed an important role during the Late Warring States period and served as part of the royal area, so its residents might have had little difficulty obtaining commodities that were being manufactured in Xianyang.

In general, Figure 4 shows that iron objects were not ubiquitous in the Qin state beyond the capital area throughout the Warring States-Qin period. Even in first-rank centers such as Baoji, the types and frequencies of iron objects are low. This discrepancy is even more noticeable between the capital and peripheral or second-rank centers, indicating a primitive development of the market economy in the Warring States period. After aggregating all iron items together into the broad category "iron objects," the distribution pattern clearly shows that the percentage of tombs containing iron objects relates to the proximity to the capital (Fig. 5). For the small to medium-sized tombs examined in this study, the ones in the capital area were more likely to yield iron knives and belt-hooks than those that were remote from it (Fig. 4, Fig. 5). Also, tombs in the capital appear to include iron objects more frequently than those in both the first-rank and second-rank settlements (Table 6, $p < .001$).

During the Western Han period, the assemblage of iron objects in the entire Wei river valley changed in certain ways (Table 3). First, the major types of iron artefacts became more diversified. For instance, iron swords, vessels, and lamps occurred more widely in burial goods assemblages (Fig. 6). Another remarkable change was that iron belt-hooks were rarely found. However, the most remarkable change in the regional assemblage pattern was that iron objects appeared more frequently in second-rank centers, even though some were far from the capital in Chang'an. In Figure 6, I show the percentage of tombs in different groups that yielded major categories of iron objects. Certain types of iron objects such as digging tools are absent from tombs in some burial groups, but each burial group includes at least four types. No clear-cut distributional patterns can be identified, especially in relation to the distance of different burial groups from the capital. Although the percentages are subject to variation due to small numbers of samples in some burial groups, the pattern is nevertheless distinguished from that of the Qin assemblage, which was characterized by a low percentage of tombs yielding limited types of iron objects at lower-level centers.

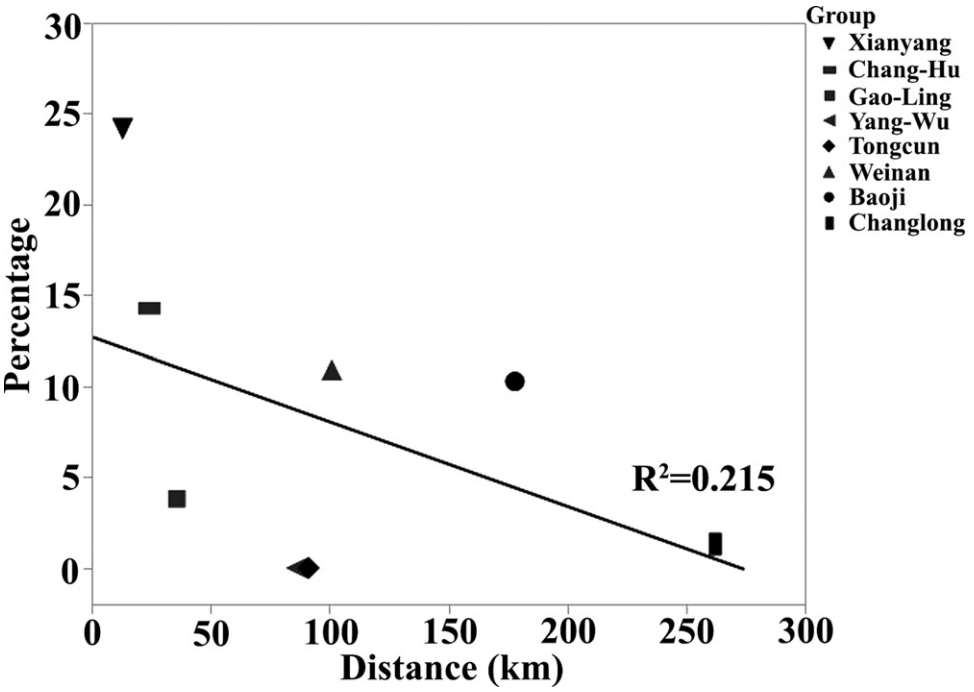

Fig. 5. Graph showing correlation between distance to Xianyang city and percentage of tombs containing iron objects in eight burial groups during the Middle Warring States and Qin unification periods (ca. 300–206 B.C.). *X* axis: distance from a burial group to Xianyang city (calculated by the average distance between the cemeteries in the area to the capital); *Y* axis: percentage of tombs containing any one of four types of iron objects in the burial group.

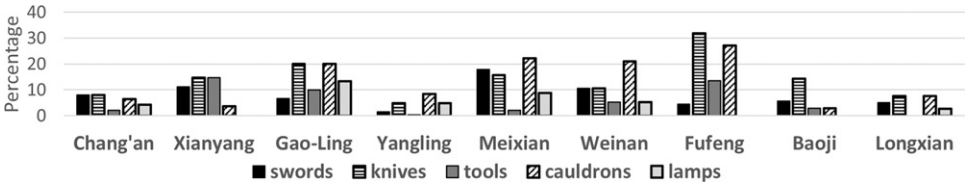

Fig. 6. Percentage of tombs containing iron items in nine burial groups in Guanzhong during the Western Han period.

In Figure 6, for the areas studied, the percentages of tombs containing the four major types of iron artifacts reveal a rather mosaic-like scenario. In some areas, the percentages of burials containing certain types of iron objects are relatively high. For instance, the percentage of iron cauldrons seems to be particularly high in Meixian. However, the prevalence of iron swords and knives in Yangling appears to be the lowest in comparison with other burial groups. Furthermore, although an ironworks was established in Taicheng, Yangling (Shaanxisheng Yanjiuyuan 2018), the proximity to an ironworks did not result in significantly higher percentages of iron objects from tombs in local assemblages. In general, the data do not support the idea that tombs in the

TABLE 6. COMPARISON OF PERCENTAGES OF IRON AND BRONZE OBJECTS FOUND IN WARRING STATES-QIN TOMBS FROM CAPITAL, FIRST-RANK, AND SECOND-RANK SETTLEMENTS

	CAPITAL ($N = 272$)	FIRST-RANK SETTLEMENTS ($N = 497$)	SECOND-RANK SETTLEMENTS ($N = 249$)	COMPARISON p[a]
% iron objects in tombs	24.18	13.46	3.48	<.001
	24.18	13.46		<.001
	24.18		3.48	<.001
		13.46	3.48	<.001
% bronze objects in tombs	46	25.85	14.73	<.001
	46	25.85		<.001
	46		14.73	<.001
		25.85	14.73	<.001

[a] For each category (iron and bronze), the p-value in the top row represents a comparison between all three types of settlements: capital, first-rank, and second-rank; p-values in the second, third, and fourth rows represent comparisons between two of the three types of settlements.

Chang'an area had a higher probability of containing more iron objects simply because the local population had greater access to iron resources or were closer to the transportation center. Nor do the data support the viewpoint that burials in settlements of higher rank or with evidence of production show a higher prevalence (in terms of type or frequency) of iron objects in tombs. To better test this conclusion, I aggregated

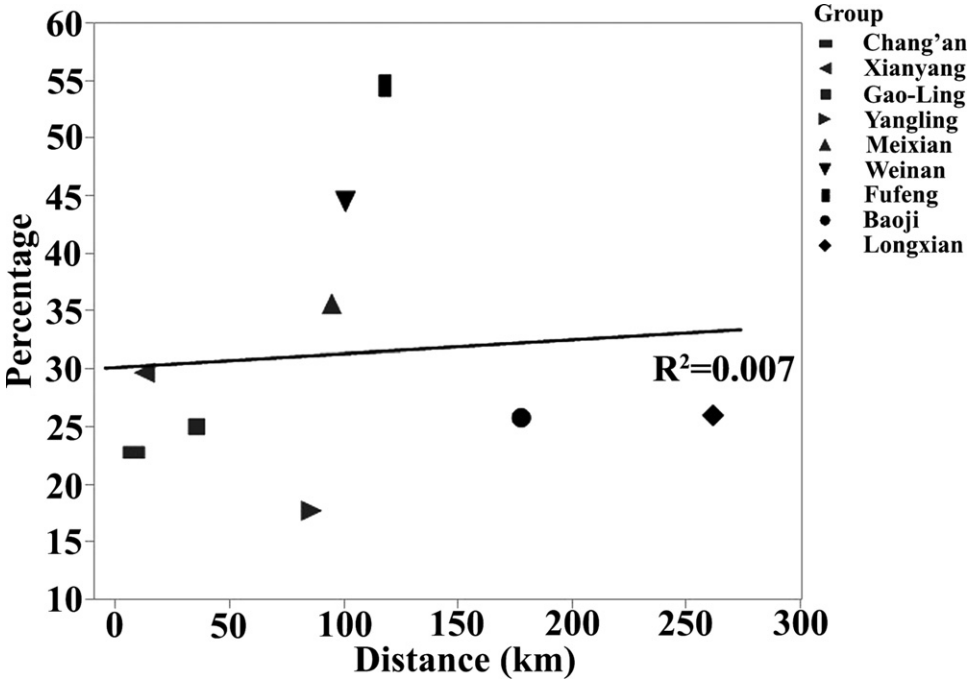

Fig. 7. Graph showing correlation between distance to capital and percentage of tombs containing iron objects in nine burial groups during the Western Han period (202 B.C.–A.D. 8).

Table 7. Comparison of Percentages of Iron and Bronze Objects Found in Western Han Tombs from Capital, First-rank, and Second-rank Settlements

	Capital ($N = 1041$)	First-rank settlements ($N = 92$)	Second-rank settlements ($N = 431$)	Comparison p[a]
% iron objects in tombs	22.77	26.63	23.73	.749
	22.77	26.63		.459
	22.77		23.73	.77
		26.63	23.73	.583
% bronze objects in tombs	43.8	41.73	26.45	<.001
	43.8	41.73		.643
	43.8		26.45	<.001
		41.73	26.45	.004

[a] For each category (iron and bronze), the p-value in the top row represents a comparison between all three types of settlements: capital, first-rank, and second-rank; p-values in the second, third, and fourth rows represent comparisons between two of the three types of settlements.

all iron items into the generic category "iron objects" in order to calculate the percentage of tombs in each area containing at least one type of iron object (Fig. 7). The result clearly reinforces the idea that there is no correlation between distance from the Western Han capital and the percentage of tombs containing iron objects.

As I explained above, the consumption of iron objects, whether final or semi-finished products, at local centers in the Wei river valley would have depended upon access to goods being supplied by external sources via an interregional transportation network, of which Chang'an was the key redistribution center (Lam et al. 2018). The study of iron assemblages and distribution patterns during the Western Han period further indicates that an active regional market system had contributed to the transportation and movement of goods throughout the entire capital region. Besides these points, the distribution of types present in the Han iron assemblages appears to be more homogeneous than during the Warring States period, and the frequency of vessels, tools, and weapons contained in tombs seem to follow a market-dominated pattern, in that the frequencies of occurence do not decrease in line with the increase of distance from the capital center in the same market zone. The percentage of iron objects in the capital was also not higher than that in first-rank (Table 7, $p = .459$) or second-rank Han settlements (Table 7, $p = .77$). Consequently, economic integration appears to have improved by the Han period and it was no longer dominated by a "dendritic model" of market distribution. Perhaps as a result of the well-integrated regional market system, even residents of the most distant areas such as Longxian and Baoji were able to gain access to iron assemblages similar to those obtained by residents in Chang'an. Distance or political rank apparently ceased to be key factors in the distribution patterns of iron objects during the Western Han period.

THE DISTRIBUTION OF BRONZE COMMODITIES

The collection of bronze objects from tombs selected for the study of distribution patterns includes everyday goods (including belt-hooks, mirrors, cauldrons, and coins), tools, coffin decorations, chariot-fittings, and weapons (including halberds, swords, spearheads, and arrowheads). Since the last two broad groups are relatively rare in the

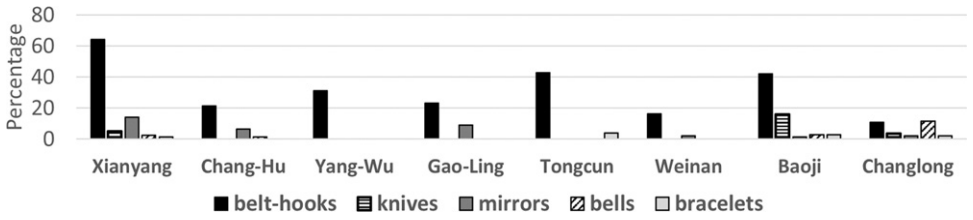

Fig. 8. Percentage of tombs containing bronze items in eight burial groups in Guanzhong during the Warring States through Qin periods.

assemblage, I suspect that these items might have been associated with individuals of special social rank and therefore controlled by the government to a certain extent. In order to make the bronze assemblage data comparable to those for the iron assemblages, I present data on bronze belt-hooks, knives, mirrors, bells, bracelets, chariot-fittings, vessels, weapons, and coffin decorations, but exclude data for heirloom objects (e.g., coins) or that appear very infrequently in tombs.[9]

Figure 8 shows the percentage of tombs containing major types of bronzes. As mentioned above, the most common type of bronze object found in Warring States burials is the belt-hook. In the Xianyang group, the percentage of tombs containing bronze belt-hooks is as high as 62 percent. Bronze belt-hooks are also very ubiquitous in other areas included in this study, however, the percentage of bronze belt-hooks in Xianyang is higher than in other burial groups. For example, only about 10 percent of tombs in Changlong and Weinan contained bronze belt-hooks. This pattern is similar to the inter-site pattern of the iron belt-hooks discussed above.

Bronze knives were often found in elite tombs well before the Warring States period, but only after the fifth century B.C. did bronze knives become fully accessible to commoners as everyday products or burial goods. The inter-site comparison reveals a distribution pattern quite different from that of iron knives (Fig. 8). Bronze knives are almost absent from Chang'an burials. Also, the percentage in Xianyang is relatively low, even lower than the percentage in Baoji. However, small numbers of bronze knives, bells, mirrors, and bracelets have been identified in the Changlong area.

Compared with the iron industry, the bronze industry had a much longer history of development in the Qin state and included multiple manufacturing centers. Since the distribution pattern of bronze objects might have been skewed by local production at multiple centers, the percentage of other bronze items in assemblages do not present a clear correlation to distance from the capital (Fig. 9). The less dramatic differentiation between the capital and lower-ranked also seems to be in alignment with the administrative model of distribution. A difference between the center and peripheral areas is still identifiable, but is not as distinctive for bronze as for iron objects. Intergroup variations in bronze objects also display an interesting parallel with the patterning of iron objects. During the Warring States-Qin period, the percentages of tombs in Xianyang containing at least one bronze object are generally higher than for other burial groups (Fig. 9). Meanwhile, the Weinan and Changlong figures are relatively low, probably because of their distance from the capital. The percentage in Baoji is second highest, which may be attributable to its unique political significance as a capital city that was used for more than 300 years. Even after the capital was moved to

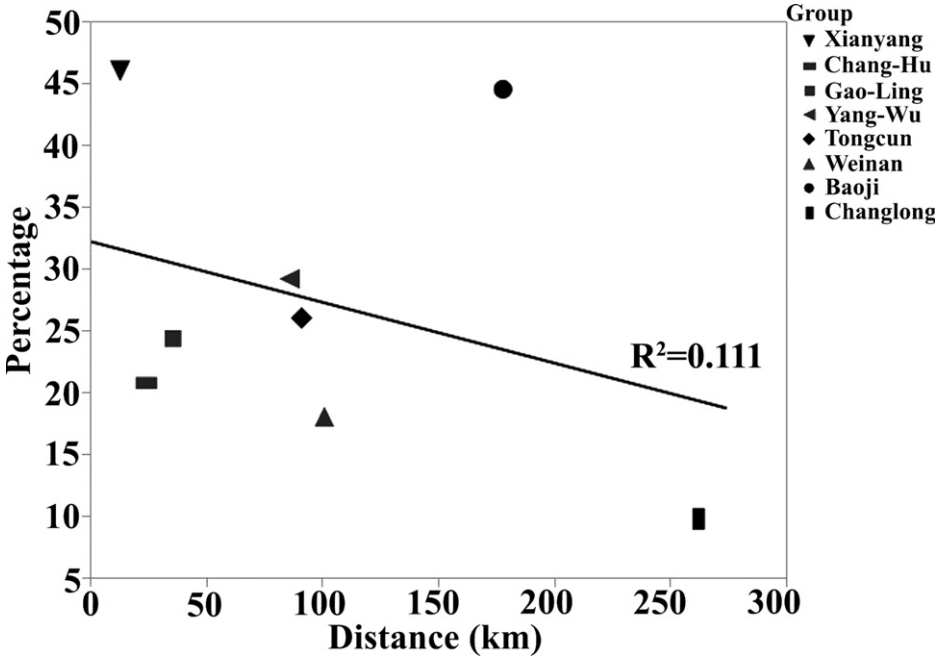

Fig. 9. Correlation between distance and percentage of tombs containing bronze objects in eight burial groups from the Middle Warring States through Qin unification periods (ca. 300–206 B.C.).

Xianyang, Baoji continued to serve as a ritual center (i.e., Yong). Other types of bronzes such as mirrors that are usually less common in assemblages are more often found in Xianyang than other burial groups. In general, tombs in the capital area and first-rank settlements seem to yield bronze objects more frequently (Table 6, $p < .001$), regardless of whether the items indicate high social status or not.

Again in parallel with the iron assemblages, the strong influence of the capital over the distribution of bronze assemblages gradually declined in the Han period. A quick look at the bar chart in Figure 10 reveals the difference between the Han and Warring States-Qin periods. Han tombs yielded bronze objects more frequently and indicated rather homogeneous assemblages, while most clusters from the Warring States-Qin period do not have assemblages containing mirrors, bells, or bracelets. The availability

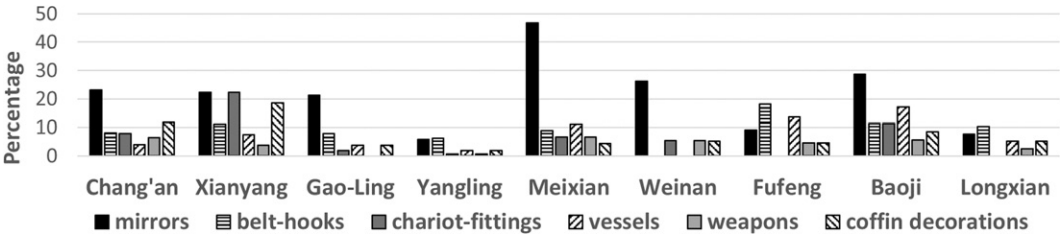

Fig. 10. Percentage of tombs containing bronze items in nine burial groups in Guanzhong during the Western Han period.

of bronze objects during the Han period seems to have been less dependent on proximity to production centers and perhaps the transportation costs associated with exchange. Low-scale exchange between centers within these areas already existed before Qin unification, but the pattern does not appear to indicate the existence of a large, regional market network. After the collapse of the Qin dynasty and reunification under the Western Han, the bronze industry began to develop similarly to the iron industry. Bronze assemblages include more items such as chariot-fittings, bronze vessels, and crossbows and tombs in each area contain greater or lesser percentages of objects from most of these categories. Eventually, the phenomenon of capital dominance over production and distribution of bronzes simply disappeared.

Moreover, the frequencies of bronze objects in most areas do not correspond to the distance of each area from the capital, Chang'an, during the Han period (Fig. 11). For instance, in Xianyang, Baoji, and Meixian, the percentages of Western Han tombs including bronze mirrors are more or less similar to Chang'an. There is no clear evidence demonstrating a close correlation between distance and access to bronze items (Fig. 11). Also, echoing the distribution pattern of iron objects, the percentage of bronze objects in the capital was not significantly higher than that in first-rank settlements (Table 7, $p = .643$), even though the percentage in second-rank settlements is lower than both the capital (Table 7, $p < .001$) and first-rank settlements (Table 7, $p = .004$).

In sum, the distribution patterns of bronze and iron objects in the Han period bear a degree of similarity. During the Han period, distribution shows relatively

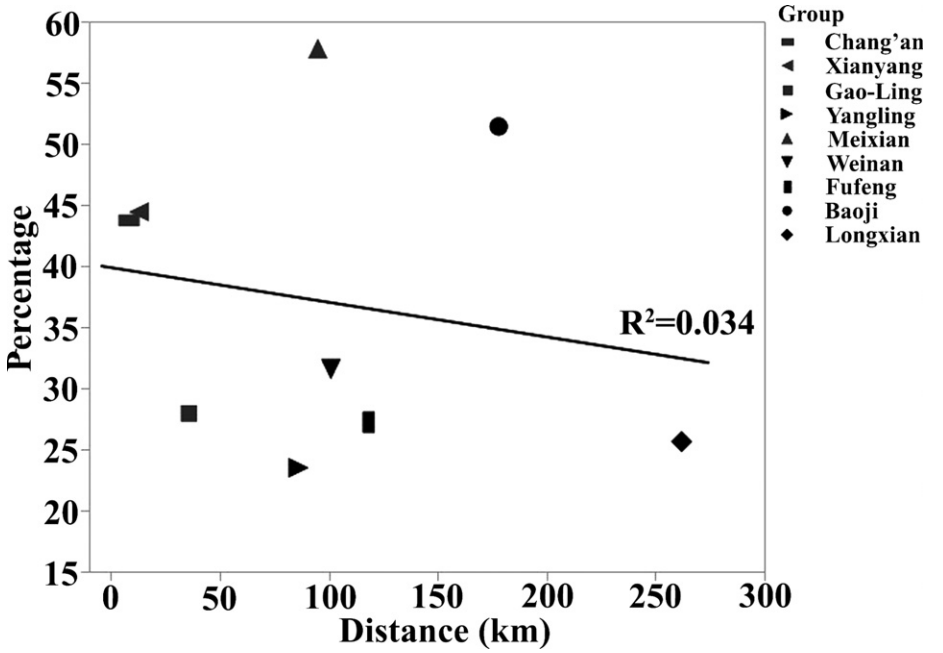

Fig. 11. Graph showing correlation between distance to capital and percentage of tombs containing bronze objects in nine burial groups during the Western Han period (202 B.C.–A.D. 8).

homogeneous patterns in terms of types of bronze goods and the percentage of tombs containing them in each area. Also, no clear linear fall-off patterns can be identified in the graphs of the relationship between frequency and distance (Fig. 7, Fig. 11). If a developed market system was responsible for distributing iron products from production sites to different local centers, then the similar distribution patterns for bronze items identified in archaeological contexts indicate that these products were probably distributed by the same mechanism, although distribution to outliers such as Meixian might still have been affected by intervention from administrative centers (Fig. 11). The variation in the availability of some everyday bronze objects between different centers probably reflects the fact that the control of movements of goods still remained a key function of major political centers. Nevertheless, the dendritic model was by no means the major mechanism responsible for the distribution pattern observed for the Western Han period.

DISCUSSION AND CONCLUSION

The market system is essential to our understanding of the economic foundation of early Chinese empires, but its mechanisms at various levels of the society, especially at the regional scale, have not been adequately addressed in the literature. In order to clarify the social function of market exchange in the distribution of commodities and organization of social lives, this study has examined the distribution patterns of iron and bronze items within the Guanzhong basin, one of the most important regions for early Imperial China. Combining integration studies with models of market exchange, this article used the distribution patterns of iron and bronze objects to clarify the mechanisms by which intraregional market exchange was structured. Given the rich published material on burials in Chinese archaeology, the comparison of distribution patterns of iron and bronze objects from tombs of commoners of moderate social status are seen to provide a significant and meaningful measurement of market integration in early Imperial China.

I have suggested that the degree of integration via market exchange can be classified in terms of three models: dendritic, administrative-integrated, and fully-integrated. Following clarification of various types of connections that underly market exchange, this study argues that the distribution pattern of commodities at a regional scale can shed light on the evolution of imperial integration. Contrary to the idea that market exchange already dominated economic transactions during the Qin period (Yuan 1987:61–63), the distribution patterns seen in the Warring States-Qin data indicate that the exchange of goods in the core region should actually be considered an example of "dendritic exchange," in which the exchange of metal commodities was primarily controlled by the capital at Xianyang. Meanwhile, burials in the capital and other areas demonstrate a substantial difference in terms of the percentages of tombs having metal objects. To be more specific, burials in the capital area more frequently contain bronze and iron objects than those in other first- or second-rank centers. Perhaps due to the lack of a suitable network beyond the capital, surplus supplies of metal goods manufactured inside the capital could not be effectively distributed on a large scale to other settlements of lower rank. Although a small-scale administrative-integrated market system between the capital and first-rank centers might have existed for the transportation of bronze objects outside the capital during this period, the entire network was focused only on the capital, and movements of goods to lower-rank

settlements appear to have been hindered by the limitations of transport capacity. Despite the fact that market exchange was obviously present inside the capital, it is unlikely that a fully-integrated market exchange system existed in the Qin state across the Wei river valley.

In contrast, a defining feature of the iron and bronze assemblages of the Han period is that the percentage of tombs containing metalwork are not dramatically difference between the capital and lower-ranking centers. This presents a more "fully-integrated" scenario in the Wei river valley compared to the Qin period. Iron knives, swords, and cauldrons appear to have been prevalent in burial contexts in various areas and centers, and the assemblages are relatively homogeneous. The percentage of tombs in the capital (Chang'an) containing at least one type of iron and bronze object is no longer significantly higher than for any of the other areas discussed in this study. The distribution implies that a new system of market exchange was serving to integrate different local centers through the consumption of iron and bronze objects. In short, the Western Han case may be closer to a fully-integrated system, even though some administrative centers still partially dominated the transportation and supply of bronze objects. Given the lack of more detailed textual records relating to the manufacture and distribution of goods, it is impossible at this stage to identify the extent to which the state was involved in "market exchange." At the very least, though, the sheer numbers of iron and bronze objects found in the centers studied here indicate that market networks in the Han period appear to have been much better developed and more fully-integrated than in the Qin period. The absence of patterns of monotonic depletion in the distribution of metal products suggests that they probably became more accessible to consumers during the Han period. These changes in the distribution patterns reveal market penetration and increasing connectivity, which in turn reflect the evolution of the market economy and commodities exchange in the region of the political headquarters.

Although it was not clearly articulated in historical texts, I argue that the existence of a well-developed, integrated market system centered on the capital should be foregrounded in future attempts to understand the economic influence of the capital region as one of the major factors structuring the widespread distribution of material culture such as iron and bronze implements. As I alluded to earlier, after making Chang'an its capital, the Western Han empire transformed the Wei river valley into not just a political headquarters, but also a central locus for imperial consumption. However, the iron production remains identified in the Guanzhong basin suggest it was relatively small-scale compared to its huge population. Meanwhile, there is no clear evidence to suggest that a majority of the everyday bronze goods found in tombs could have been manufactured locally. In order to address this apparent discrepancy between production and consumption (supply and demand) within the Guanzhong basin, a sophisticated communication network linking the capital to other regions within the empire perhaps was probably created to facilitate the movement of staple foods and commodities of various types into the capital region. Nonetheless, the large-scale interregional transportation network could not alone efficiently supply goods to the majority of commoners in the region. A well-integrated regional distribution network must also have existed and cooperated with the interregional system to distribute metal products, semi-finished products, and even raw materials from other regions to settlements of different sizes within the Wei river valley. This scenario is reflected in the iron and bronze assemblage data from tombs in the region. In other words, the Han

capital and surrounding capital region was able to serve as a convergence point for the entire empire described in historical texts not only because of its interregional transportation infrastructure, but also because it developed an intraregional system that interconnected the capital to settlements of different rank in Guanzhong.

If the development of intraregional market exchange in parallel with that of an interregional system indeed lay down an economic foundation for the supply of important daily items to medium or even small-scale settlements in the region, then the essential next step towards a fuller explanation of market exchange in the entire Han empire would logically involve a focus on manufacturing and market-exchange of metal objects in other regions outside the Wei river valley. For instance, it would be useful to establish whether the large-scale ironworks in other iron-making regions (e.g., Henan Commandery) were capable of manufacturing sufficiently high volumes of daily implements and semi-finished products to meet their own local demands and provide a surplus for shipment to consumers in other regions of the empire. It would also be good to identify the extent to which fully-integrated market networks existed and served to interconnect settlements of various scales in other regions. From a methodological perspective, could the idealized models of market exchange proposed in this article be applied to portraying market systems in other regions using burial data? Finally, the development of a research focus on regional market systems might provide new perspectives from which to examine a larger body of questions, including the extent to which the formation of intraregional and interregional market systems in the Han period contributed to the creation of conditions in early empires that eventually resulted in the emergence of large-scale, unified polities over the long run (Fang et al. 2015).

Although these issues are challenging, I hope that the current application of a tripartite framework to the question of imperial market exchange through the study of iron and bronze distribution in the Wei river valley will encourage further research into the forms and roles of market exchange in early China and beyond. Ultimately, the reconstruction of market systems and their development in different regions of the Han empire may contribute to disentangling convoluted and long-lasting debates over the role played by integration in studies of ancient market economies.

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NOTES

1. This study focuses only on the Western Han Dynasty (206 B.C.–9 A.D.). After the collapse of the Western Han Empire, the capital moved to present-day Luoyang in Henan Province because of the

severe destruction that had resulted from warfare. Although the economic system of the Eastern Han would not have been completely different from the Western Han, Eastern Han data from Guanzhong could not be incorporated into studying the issue of market development from a longer-term perspective because even the most detailed reports on Eastern Han sites have reported only around 200 tombs. The lack of published archaeological information severely hinders research on this issue.

2. Even though the parameters used to describe diversity can be generalized into the three of categories of richness, evenness, and heterogeneity, most previous research (e.g., Garraty 2009; Minc 2006) only focused on heterogeneity, and advocated the use of Brainerd-Robinson coefficients, devised for archaeological research, to describe this dimension. But here we will primarily compare the number of types identified and investigate if each cluster has all major types of iron or bronze artefacts. Because the occurrence and frequencies of iron and bronze objects in tombs are subject to various factors, and the percentage of assemblages calculated in this work only reflects an "overall" pattern represented in a cluster, the use of percentage to run BR coefficients could generate very biased results. Therefore, we preferred to focus on a much simpler approach using "richness" to describe to what extent assemblages are similar.
3. After the reign of Emperor Wu of Han (141–87 B.C.), at least 400 million bushels of cereal could to be transported annually to Guanzhong from its eastern territories, which were used to sustain not only residents in Guanzhong but also the military frontiers in the Hexi corridor (*Hanshu* 24a:1142).
4. Equifinality is the idea that the same final outcome can result from different initial conditions or through different means (Lyman 2004).
5. In comparison with iron, bronze objects are more likely to be targets of looters and less likely to be remain after looting. Destructive looting might therefore have a greater impact on the assemblage and distribution patterns of bronze objects than iron objects.
6. The dataset also excludes tombs of high-ranking officials who clearly held at least 2000-bushel *shi* rank or might have been related to royalty.
7. Theoretically, if one type of artifact only appeared in one cluster but was quite commonly found there (i.e., with a frequency was over 10%), it would also be listed here. However, this scenario does not occur in this dataset.
8. Only 13 iron or steel swords have so far been identified from the Qin tombs dataset.
9. Bronze coins also became popular during the Warring States period. Bronze coins of different dates are often discovered in the same tomb, suggesting they might have been passed down from previous generations as heirlooms or been in circulation for long periods. Since this issue cannot be resolved, coins were excluded from this study.

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