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Micro Foundations In The Great Divergence Debate:
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Abstract

Prevailing approaches in historical studies adopt a macro view and place an overwhelming emphasis on the Industrial Revolution as a major discontinuity in Western development. On the contrary, recent research in accounting, management and business history has suggested a different direction. When opting for a micro-level focus, crucial discontinuities in management and accounting in the West can be traced back to the Renaissance Period. The paper thus searches for 'micro foundations' in managing and accounting practices to address the on-going debate on the East-West divergence. Despite the obvious problems with source availability, we outline a new research agenda for the debate.

Keywords: Great Divergence Debate; Venice Arsenal; accounting and capitalism; proto-industrial settings; premodern bureaucracies

JEL Codes: L23, M41 and N8

A. Introduction

This is a positioning paper to experiment on an overlooked area of research: the micro foundation of the Great Divergence Debate and some crucial questions that have not been previously dealt with.

Accounting and management mainstreams have so far been seriously criticized for their Western bias, or Anglo-centrism to be more precise (see e.g. Zan, 1994, 2004; Zambon, 1995; Engwall, 1998; Carmona & Zan, 2002; Zambon & Zan, 2007), ignoring traditions and historiographies outside what is written in English. Even worse, Anglo-American management studies appear to have no interest in either history or the rest of the world (Kieser, 1994; Thomson, 2001; Zan 2005, 2015; van Fleet, 2008; Rowlinson et al., 2011). Therefore, empirical based studies of the East are exceptions in management and accounting journals and international conferences. Likewise, global history is rarely acknowledged by accounting and management literatures.

Moreover, West-centrism tends to pay attention to the East only when it dissects the West in some way (e.g. Marco Polo's adventure). In any case, it is seen as a sort of mistake: why evolution did not take place in Asia as it could have, meaning that the East was a case of missed opportunities compared with the West).

Global history is a new intellectual movement, questioning in depth some of the basic views of historical mainstream traditions and searching for alternative explanations within a pluralist (and more tolerant) view of diversities and varieties of evolution. One episode of this intellectual movement is the "Great Divergence Debate", revisiting the differences and similarities between the East and West. Suffice it here to refer to the main research question that this debate asks: Why and when the East was overtaken by the West after Asia's supremacy for centuries in technological inventions (paper, print, powder to name but a few). However, and as our starting point, this debate has a macro focus and looks at macroeconomic phenomena and aggregates. To what extent, the issue of micro divergence, e.g. how practices in accounting and managing were involved in shaping growth and development path is never addressed.

Obviously there is a gap between macro studies on Great Divergence and micro studies of accounting and management to be filled up to benefit our understanding of our global past. In particular, "Explaining the East" would challenge management and accounting traditions by forcing them to face a completely different context and evolution. Just consider the different role of trust and "counter-role" in control; or more widely, the possible patterns of the emergence of modern management and accounting discourse; or again, how this could provide a different context for the whole debate on the role of DEB – double entry bookkeeping – in the development of capitalism.. Huge cultural differences will help address explicitly important elements that are taken for granted – and largely unexplored – when focusing on similar and homogenous contexts.

In turn, adopting a micro view in understanding the Great Divergence will help address important elements that can only be understood with this sort of zooming in, considering social and intellectual dynamics that are constitutive elements of both practices and changes over time. Paraphrasing the well-known expression by Hopwood (1987), “accounting becoming what it was not”, one could refer to accounting becoming what *it is not* in a different context. The huge history of public/imperial administration in China – largely underrepresented at least in terms of English publications – could be further investigated and brought into the debate.

To operationalize such analysis, this paper proposes a parallel investigation between the Venice Arsenal (at turn of the 16th century) and China (mainly the Ming-Qing Period). Such a parallel may sound unusual, and certainly involves delicate epistemological issues.¹ In the Great Divergence Debate circle, the focus is on the national level, usually explicitly (Edwards, 2013). Meanwhile, there are risks of anachronisms, e.g. in the case referring to “Italy” in a context of city-states, be it the Venice Republic, wherein a different level of analysis would be necessary. There is also an issue of levels of analyses. Innovations take place at the organizational level, including the state itself. Indeed, we are focusing on an individual organization the Venice Arsenal, based on a detailed investigation on the dialogue between this entity and the governing bodies of the Republic. The context however is very familiar to accounting historians, the development (and spread out across all Europe) of the “Venetian method”.

The paper is structured as follows. The next section provides a reconstruction of the Great Divergence Debate. Section 3 briefly revises the accounting history debate on early examples of modern management and accounting discourse, focusing on recent findings in proto-industrial settings such as the Venice Arsenal. Section 4 develops the research questions so that the Venice roots of the Renaissance shed lights on the Great Divergence Debate. Section 5 discusses some major difficulties with similar research agendas in term of archives in China. Conclusions then follow.

B. A Short Review of the Great Divergence Debate

This debate began in 2000 with Kenneth Pomeranz’s seminal monograph with the same title. In essence, Pomeranz and his colleagues of the ‘California School’² argue that there existed two parallel growth patterns and trajectories in the world in the past millennium with which not only

¹ However, this will appear less strange in the pre-Renaissance period, acknowledging a structure of trade which is very anti-intuitive to image in our days: see Abu-Lughod, 1989.

² The name ‘California School’ was coined by Jack Goldstone. It includes a group of *avant-garde* historians who all have their purses in California and view the world and world history from a non-Eurocentric (or non-Atlantic) way. They include A. G. Frank, R. B. Wong, Kenneth Pomeranz, and Jack A. Goldstone himself.

East Asia (China) and Eastern Europe once shared a range of similarities but also East Asia led the world in development. Pomeranz's thesis challenges head on the *hitherto* mainstream of the Eurocentric view, which ranks Western Europe permanently on the top of the league table of growth and development in the world. With recognizable connections across the Old World (see Bentley, 1993; Bentley et. al., 2000), the Great Divergence Debate has opened many perspectives in the understanding of the different evolutionary paths in the East and West:

“[The topic] is as old as the social sciences... The most popular approach is still the one that builds on the legacy of Max Weber and his claim that the West underwent a uniquely intense process of rationalisation that resulted in the emergence of capitalist market economies, bureaucratic states and a disenchanted culture that was ideally suited to produce science, technology and a methodical way of living... In this line of thinking the economic ‘rise of the West’ is almost identified with ‘the rise of the market’, a thesis that mainstream economists as well as their increasingly popular ‘institutionalist’ colleagues, enthusiastically support... Weberians focus on developments in Europe. They regard its history as structurally and fundamentally different from that of the rest of the world. To them, the Great Divergence is the culmination of a long process, not something fairly contingent that could have occurred anyplace. They regard what happens in ‘the rest’ as of no fundamental relevance to the main direction of modern Western history.” (Vries, 2010, p. 732)

The recent development of the debate however started with the seminal work by Joseph Needham which has been dubbed as “one of the major scholarly enterprise of the century” (Keightley, 1972; see also Finlay, 2000). Needham's gigantic research program aimed to reconstruct the contribution of China to technological developments over centuries, something that has previously been overlooked.³ The issue emerging from the inversion of this path is that while importing technologies from the East for millennia, the West superseded the East, and led economic and technological development of the world in the last centuries. One of the major elements of controversy surrounding this is the exact timing of this inversion. Comparing living standards in China's lower Yangtze Delta and the wealthy part of Western Europe, Pomeranz argues that the two areas functioned very similarly until *circa* 1750, positioning the China-West dichotomy in developmental paths centuries later than what has commonly been suggested.

Pomeranz's thesis triggered such upheaval in the history discipline that scholars are now forced to choose between the old and more Eurocentric school and the “California School”. The former has a clear tint of European/Western triumphalism; the latter shows, from a very different angle of consumption and living standard, a universal path and pattern for both China and the West.

³ According to Joseph Needham, China did not need European knowledge in most areas and developed independently a cluster of technologies that allowed it to lead the world from c. 100 BCE to c. 1550 CE; see Needham 1954–2008.

What separated the two was largely the role of historical contingencies or simply one-off ‘lucks’ in explaining the eventual divergence. Indeed, in the past decade the main spin-off of the Great Divergence Debate has been living standards and real wages in global history (e.g. Allen et al., 2005). Divergence of proto-industrial and early modern examples are highlighted by Goldstone (2002: 329; 332). In our view, Pomeranz’s work still bears the hallmark of macro approaches in historical research and all the consequent debate shows the same propensity.

There exist already several reviews of the whole debate which provide detailed insights about the topic (e.g. Deng, 2000; Bryant, 2006; Vries, 2010; Broadberry, 2013). Rather than providing a further literature review, we can provide some interesting observations on the impact of this debate within the community of Chinese historians. The Great Divergence notion and debate have made inroads to China rather slowly and with mixed reactions (which is somewhat surprising, considering the emphasis on “Chinese civilization” that often characterizes the debate on history and heritage in recent Chinese rhetoric). Since 1949, the fields of historical studies have been dominated by Marxian “historical materialism”, which was undoubtedly modeled after Western Europe but was disguised as the universal truth. Despite the fact that Asia has a longer written history and larger population than Western Europe, Asia (including China) has been labeled as an “exception” (or “abnormal”) with what is called the “Asiatic Mode of Production”, fabricated by Karl Marx. So, by 2000, the main concern in Chinese economic history was why China was not another Western Europe (e.g. Wu, 2001; Wang, 2001; Wang and Liu, 2001; Liu, 2001), something that was shared by dogmatic Marxists as well as those who accepted a uni-linear growth path in history (Hobson, 2004). In this context, the most talked about issues among Chinese historians were “feudalism”, “capitalist sprouts” and “undue delay of capitalism” as if China differed from Medieval Western Europe and Tokugawa Japan only in its super-long infancy of capitalism.

Against this backdrop, many scholars in Mainland China, especially those of the older generation, find it hard to accept or accommodate the shock of the “California School” (e.g. Wu and Tong, 2003; Li and Jiang, 2005; Ye, 2007; Fu, 2008; Fan, 2008; Cheng and Lan, 2009; Wu, 2009; Fang, 2010). They cannot understand the notion that the best ideology, technology and institutions came from Asia (Hobson, 2004), and that China’s indigenous institutions and economy were highly rational and efficient and could have continued indefinitely (e.g. Wong, 1997; Hobson, 2012). To agree with the California School could be politically embarrassing: If China functioned so well as to match the West, there would be no need for change and revolutions in the twentieth century (from Sun Yat-sen to Maoism). As a result, the official version of Chinese history from the Qing Period (1644–1911) until 1949 has remained unchanged.

On China’s mainland, there has nevertheless been an emerging undercurrent to join the bandwagon of the California School. For example, a large body of studies of China’s landlords

claimed that there was no excessive exploitation in the traditional economy of China (Gao, 2005). However, overall, attempts to follow up the new trend in Chinese studies of the West are patchy. The most common approach by far in mainland China seems to have been that of Maddison (1998) who had no stated social-political alignment in the debate other than sets of estimates.

Paradoxically, the whole debate of the Great Divergence risks being characterized as a Western debate, with strong disagreements between Western scholars, while Chinese scholars stand suspiciously at the border. The most open-minded scholars of Chinese origin in the Great Divergence Debate have turned out to be those who left China for the West. The most prominent among them is probably Li Bozhong who specialised in economic growth and development on the lower Yangzi Delta from the Tang Period (618–907) onwards (Li, 1990, 1998, 2000, 2003).⁴ Li's view that some regions such as Songjiang Prefecture in the delta were and remained advanced in East Asia technologically and institutionally, made him a natural ally of the California School. He did physically join the school when he took a post at Caltech in the 2000s. Another influential player is James Lee who specializes in historical demography and runs a population research center at the Hong Kong University of Science and Technology. Lee's approach to the debate is to look at it from how a standing population was supported. The Great Divergence Debate has made his group increasingly more comparative across Eurasia (Tsuya et al., 2011). In offshore Taiwan and Hong Kong where the Marxian influence is traditionally weak, scholars of Chinese economic history have shifted their research attention from the *repertoire* period of the Yuan-Ming-Qing (1279–1644) when China is believed to have been well ahead of West Europe and Japan (e.g. Liu, 2012; Edwards, 2013).

To conclude, so far such comparisons have mainly been conducted at the macro-level, i.e. macro regions (e.g. the Yangtze Delta and Western Europe), macro sectors (e.g. technology, services, industry, farming, and governance), and macro issues (e.g. growth, development, living standards), while “[t]he narrow attention economic historians have focused on the market has obscured the impact of other institutions – most notably the state – in promoting economic development” (von Glahn, 2016: 8; for a similar critique see also Bryant, 2006). Studies with micro approaches have visibly fallen behind. But it is very likely that the relatively separated evolution of civilizations in the West and in the East is not only a macro phenomenon, but could be studied as micro phenomena, including ways in which businesses were organized. Here, studies of family structures, household production, consumption, property ownership and inheritance in China have

⁴ Li's propensity towards agriculture is shared by Pomeranz (1993), whose early research was on China's northern hinterland where the strengths and weaknesses of the Chinese economy showed up most clear-cut.

shed some light on micro-level uniqueness (Deng, 1999b; Lee and Wang, 1999). So, intuitively, one suspects a divergence in business management at a micro level very early on in world history.⁵

C. The Renaissance link of modern management and accounting: the Venice Arsenal

When comparing the development in the East and West, scholars on both sides seem to share a basic assumption that the British Industrial Revolution in the eighteenth century and the American Managerial Revolution in the nineteenth were the major discontinuities in economic and business history.⁶ Without intending to diminish the importance of the industrial revolution, when a micro perspective is taken, things change. One of the aspects characterizing recent developments in accounting history is the tracing back of the emergence of meaningful forms of modern managerial control, as far back as even the sixteenth century. This redefines what constitutes “modernity”, that is to say elements that are perceived as affecting only current day management and accounting practices (Blindquotation); see for instance: Parker, 1981; Hopwood, 1987, 1992; Mephram, 1988; Fleischman and Parker, 1991; Edwards and Boyns, 1992; Bhimani, 1994; Scorgie, 1997; Zan, 2004; Carnegie and Napier, 2002; Fleischman and Macve, 2002). The present study is located within this micro-level arena.

⁵ Another critique to the debate is that so far the California school has “focused intently on developing quantitative measures of economic performance to test its argument, ...[being] confined to issues and time periods for which quantitative measurements might be feasible. ... As a result, little of this scholarship examines Chinese economic history before the eighteenth century.” (von Glahn, 2016: 6).

⁶ See for instance the following sentence, none of which will survive the Venice Arsenal’s anomaly (emphasis added): “The modern firm made its first historical appearance when the volume of trade reached a level at which managerial coordination *became more efficient* and profitable than coordination through the workings of the market.” (Chandler 1977) And, “Given the *small size of firms prior to mid-nineteenth century*, specialization would remain confined within the company circle. The business would be run by the proprietors, while the need for the thorough and meticulous internal organization, detailed statistics and *cost-calculation* methods, which were to become such a marked feature of the modern firm, *was not yet felt*.” (Chandler, 1980) Also, “*Before the early nineteenth century*, virtually all exchange transactions occurred between an owner-entrepreneur and individuals who were not a part of the organization: transactions occurred in the market and measures of success were easily obtained. As a *consequence of the Industrial Revolution* and the ability to achieve gain through *economies of scale*, it became efficient for ... owners to commit significant sums of capital to their production processes. ... The long term viability and success of these ‘managed’ organizations revealed the gains that could be earned by managing a hierarchical organization. ... The emergence *more than 150 years ago* of such organizations created a *new demand for accounting information*. ... (A) demand arose for measures to determine the ‘price’ of output from internal operations, ... owners devised measures to summarize the efficiency by which labor and materials were converted to finished products, measures that also served to *motivate and evaluate the managers*.” (Johnson & Kaplan, 1987, pp. 6-7)

An interesting characteristic of this stream of research is rediscovering the role of state bureaucracies in the development of modern management and accounting discourse (and the development of capitalism itself). A particularly intriguing case is the Spanish Royal Tobacco Company (Carmona et al., 1997), where a rather sophisticated discourse about managing and management control existed in a context far from what it is normally assumed the driving force of similar solutions: a monopoly run by the state, before industrial revolution. Another intriguing case is indeed the development of management and accounting discourse in the shipbuilding of the Venice Arsenal in the sixteenth century, which we use here as a sort of “benchmark”, for its potential in falsifying mainstream views in accounting, business and economic history, and the identification of major discontinuities (blind-quotation).

This research builds on the discovery of a periodic set of reports that the people in charge of the shipbuilding entity (the Arsenal) had to prepare for the Senate of the Republic, since 1580. The research was looking at these reports in terms of discursive regularities and change. Which “chapters” were present at the beginning, which ones were maintained and which new ones were introduced later? In which ways the same “chapters” were dealt with over time, in case with what kind of changes? One can further infer what the worries, issues, and priorities were. In short, how attention was addressed (according to March, 1978, management is essentially an issue of addressing attention). What emerges is the existence of a sophisticated conversation over the organization of the Arsenal. That is, an on on-going discussion on managing issues relating to: (a) the degree of achievement of the output level (set by the Senate at 100 light and 12 great galley); (b) the sourcing of materials; (c) labor force, in terms of availability and discipline (in present-day terms, absenteeism and productivity); and (d) the conditions under which manufacturing processes were undertaken in terms of both production levels and organization (in particular, discussions about decisions on contracting-out and work discipline and control). A document prepared in 1586 by Baldisserra Drachio is of a particular interest, representing a systematic proposal to reorganize the whole activity inside the Arsenal:

“[T]he whole scheme is permeated by a performative principle that viewed an implicit notion of efficiency not as a tool for maximizing economic returns but as a moral imperative for the safety and prosperity of the Venetian Republic. Examination of the organization of production and logistics touched on a variety of different matters, including the best techniques and methods for cutting, shipping and storing timber. The crucial issue of component standardization was then discussed, with a call for the creation of a “common timber” to overcome the individual character of the component design and construction process (hitherto entrusted to each single craftsman), in order to move away from a workshop model of organization in shipbuilding. Attention also focused on redesigning the manufacturing plant's layout in order to make a more rational use of space, in line

with the demands of production. The issue of labor organization, to use present-day terminology, was addressed, on the one hand, with a definition of task-specific work teams and, on the other, with detailed debate on procedures for monitoring work attendance and performance. Lastly, the overall organizational structure was discussed and a proposal for a single top-level structure, endowed with significant powers, was put forward.” (self-quotation)

Serious accounting implications soon emerge. Another couple of innovative documents were written less than a decade later, in 1593 and 1594, by Bartolomeo Tadini, the chief accountant of the Arsenal. Tadini was worried about theft and suggested various solutions to solve the problem. He also was concerned with one of the contradictions in the Arsenal in terms of workforce. According to the rules of the guilds, workers were “enrolled” at the Arsenal, which provided them with the right to come to work, without imposing them the duty to actually get to the Arsenal. Whether they were showing up or not, was largely out of the control of the Arsenal. Tadini was clearly aware of such a hybrid solution, wherein the organization has already internalized the labor force, but it was not in control of it. For this purposes he was suggesting both carrots and sticks. The latter implies physical control on the workers, in order to reduce material appropriation, and to control the effective presence of the workers on site. The former - more interesting – involves some suggestions in order to design what we nowadays will call “incentive mechanisms” to increase the presence and effectiveness of workers:

“In an effort to involve gang bosses, what was suggested is a sort of half-yearly productivity target with related incentives (corresponding to approximately 10% of normal wages). This was to be accompanied by a set of scheduling mechanisms covering the coming week, to be updated weekly after checking the extent to which the previous week's schedule had been fulfilled. While “middle-level workers” were offered the carrot, rather more repressive control regulations were suggested for disciplining the unskilled workforce, and a series of incentives for unbroken attendance, checks on attendance and devices for registering movements were proposed. Lastly, Tadini put forward a special ad hoc work-team structure, to which was, earmarked an annual budget setting out the savings to be achieved by the proposed structure.” (self-quotation)

In the following period, further analytical innovation emerged, with additional refinement in managing people, outcomes and the relationships between the two. The notion of cost emerged in the documents (it was not present in the early ones); the notion of "work in progress" emerged in a document in 1633, with a new metrics of man months. In addition, other innovation took place, such as forecasts and expenses relating to consumption materials, and calculative practices regarding the workforce (i.e. labor needs based on technical parameters; or outcomes target that

could be reached with a certain amount of labor). A new “chapter” also emerged in the document of 1633, i.e. costing the overall production of galleys:

“To all of this was added a further new development: the systematic use of concepts and data regarding annual consumption and costs of materials, culminating with the astonishing document by Molin in 1633 ... which presented the cost of manufacturing extra-large and light galleys. In substantive terms, comments about consumptions of material and waste of working time can be found (Molin, 1633). A more aware discourse on resources of the Arsenal makes it possible to question of feasibility of the 100 galleys goal, autonomously self-reducing the goal to 50.” (self-quotation)

In short, the Venice Arsenal at the turn of the 16th century appeared as a sort of hybrid organization, that has already internalized labor relationships, but still being far from imposing control and discipline on the workers inside the Arsenal (with a gap between enrolled and active workers which will be a major issue for decades). Employing 2,000-3,000 workers, the Venice Arsenal was one of the largest and most important factories of the period in Europe, known as the “workshop of wonders”. Investigating discursive regularities and changes inside the stream of documents available at the State Archive in Venice, the development of sophisticated managerial knowledge and accounting metrics emerges. The period of 1580-1633 can be viewed as one in which important notions and metrics were constructed within a *discorso sul maneggio*, an expression explicitly used by Drachio, 1586.⁷ The notion of work in progress expressed in man-months, or the notion of cost itself, were not there in the early documents of this period but “emerged” toward its end; a complex discussion about the goal itself of the 100 galleys and its feasibility is carried out in later documents. A logic of resource allocation of alternative ways of organizing and the associated budget is there developed (see for instance Drachio and Tadini about the design of workers’ gangs).

The construction of a new body of knowledge has been developed on learning associated with a process of recording and reporting. Something much richer, profound and sophisticated than what accounting history textbooks tend to describe for this period, as a mere diffusion of bookkeeping (e.g. Melis, 1950), where costing and accounting for decision making is seen to have emerged two or three centuries later (see again the quotation of Johnson & Kaplan in a previous footnote).⁸

⁷ As it is now accepted, *maneggiare* – literally handling – is the verb from which the term management comes from.

⁸ For sure, the case of Venice itself is quite unusual in its own period: what matters it is a peculiar combination of political/military pressure (the scare of the ottomans) within a complex process of permanent production. The associate decision of the 100 galley reserves made it hard to deal with day to day operations, giving rise to the whole evolution of

If our understanding is correct, there are several elements in this proto industrial setting that are of interest for a discussion on the East-West divergence, looking at the conversation about managerial and accounting issues. First of all, relevant innovations in management and accounting (here intended as bodies of knowledge, not necessarily already institutionalized as disciplines) can be found *before, elsewhere, for different reasons* compared to what is normally assumed in business history, overcoming some of the limits of mainstream historiography: a view that has been characterized by Anglo-centrism, firm-centrism and economic reductionism (blind-quotation). The social construction of sophisticated discourse about managing and accounting (in Europe) can be found: a) at the turn of the sixteenth century rather than in industrial/managerial revolutions; b) in some European state bureaucracies more than in private business contexts in the UK and later US; and c) in contexts where economies of scale are not relevant, and where an issue of cognitive dominance of organizational complexity is crucial.

Interesting enough, with no *direct* concerns with the notion of profit, for the Arsenal was not even a firm in itself (it simply got appropriations from the Republic and faced expenditures, without “selling” anything, simply transferring the output and the end of the production process or when needed). In this sense, the whole debate on the role of DEB seems to be misplaced, biased by the notion of firm and profit, not taking into account that double entry was extensively used inside the state bureaucracy.⁹ This has important implications in terms of a new discourse about managing and accounting.

reports. Other shipyards were in completely different situations, both military and administratively. Genoa only had a reserve of 14 galleys, which were bought from private shipyards. In Barcelona, ships were confiscated from the private for war purpose, paying back a rent at the end, considering the degree of use of the ships. The Ottomans were running several shipyards as internal military bodies.

⁹ Interesting enough, there are many criticisms against the Sombart thesis, under different aspects. None of these however criticizes the direct and exclusive reference to the private firm of the analysis. Take as an example the following quotation from Yamey (1949: 119), focusing on “the simple question provoked by the thesis, namely, the contribution of double-entry accounting to the solution of problems in business organisation and administration.” At this stage, one could expect that this apply to all organizations and administrations, including public bureaucracies: but then he goes on in a completely different direction, with “reference to business accounting records from the sixteenth to the early nineteenth centuries, and more particularly to English records”. Two other dense statements by Yamey were preceding this sentence: “I shall try to show that, in the period covered in this study, this contribution not only was small, but also that it was not made by those features of the system or in solving those business problems particularly emphasised by Sombart. I also suggest, incidentally, that, in the context of the solution of business problems, double-entry accounting was not greatly superior to less elaborate methods of accounting.” While our research on the Venice Arsenal will totally disconfirm the first part of the first sentence (contributions were huge indeed), one could agree on the second part of it (not the contributions expected by Sombart) as a sort of understatement. We leave the second sentence sharing a non-fetishist understanding of DEB.

More explicitly, what drives the writers of some of the most important documents on the Arsenal is the substantive notion of “common good” of the Republic as a whole (e.g. Drachio in 1586 justifying the need to reorganize logistics and labor force to reduce wastage in a situation of increasing scarcity of wood).

The streams of documents on “management discourse” at the Venice Arsenal were already related to West-East relations through the Middle East (see Vries 2002 on the role of the states). After the victory over the Ottomans at Lepanto in 1571, Venice had a new and more powerful fleet (Lane, 1973).¹⁰ The Senate made a decision to produce a reserve of 100 galleys plus 12 great galleys for war,¹¹ though this request was hard to achieve. As a result, to urge and focus the achievement of the reserve, a stream of reports was requested by the Senate. The new routine of reporting was in itself driving an important learning process in developing a discourse about the management and accounting of the Arsenal.

Moreover, the environmental and cultural environment in which the Arsenal documents were generated was unique. One could argue that the *discorso del maneggio* and the development of accounting discourse were embedded in the Renaissance period, well beyond what is normally assumed within the “Sombart/Yamey controversy” about the role of double entry in the development of capitalism. It is not the mere double entry techniques that matters in the Venice discourse about accounting nor the lack of consciousness about the history of their discipline by management scholars themselves (Pfeffer, 2009, on the “60 years of management”). Galileo himself was involved in the Arsenal in this very period (just a few years later than the Drachio and Tadini investigations), and he explicitly acknowledged how he gained knowledge from the Arsenal’s experts in developing his new science of material resistance (their “inherited experience” and “observations”).¹² Indeed, as Valleriani (2010) puts it, “[t]he representatives of the practical knowledge of the Arsenal ... finally offered Galileo *centuries of experience*, constituted of not only

¹⁰ One could speculate more technically of the innovations that the Venetians introduced in navy warfare, for the first time using cannons on board, which completely surprised the Ottoman admirals. A small, incremental improvement on gunpowder and cannon if seen in long term evolution of warfare, which however was extremely rewarding in the short period: the victory of Lepanto (see Morin 2002 for a review from a military history point of view).

¹¹ To be more precise, the decision about the 100 galleys have been around since 1546, but never taken seriously. After Lepanto and the new Turkish fleet unexpectedly rebuilt in just a few months, the decision was re-issued and empowered (self-quotation: 153).

¹² “The constant activity which you Venetians display in your famous Arsenal suggests to the studious mind a large field for investigation, especially that part of the work which involves mechanics; for in this department all types of instruments and machines are constantly being constructed by many artisans, among whom there must be some who, partly by inherited experience and partly by their own observations, have become highly expert and clever in explanation.” (Galileo, 1638)

qualitative statements, but even quantitative indications, which Galileo integrated into his new cantilever model.” (p. 150, emphasis added) And, “Galileo ... found among the masters of the Arsenal the knowledge he needed to determine the ratio between the dimension and weight of a solid body that defines its resistance to fracture.” (p. 147)

Finally, there is little space in this context for an explanation of managerial and accounting knowledge and practices that were so crucial for current and future economic developments which echoes the “ethic of capitalism” coined by Weber (Fischhoff, 1944).¹³

D. The Renaissance roots of management and accounting discourse and the Great Divergence in Eurasian history: some contextual elements

All these considerations can be seen as critiques to mainstream economic/business/accounting histories (or historiographies) which focus on development in the West. In a sense, the “Venice anomaly” is part of the internal controversies in economic developments within the West.¹⁴ What happens if we apply the “Venice anomaly” to the Great Divergence Debate in economic history in general and focus on the micro economy? Can these differences at the micro-level help explain the timing and patterns of the divergence (in a sense: how did the West become “more advanced” and earlier than normally assumed by mainstream economic history)? Alternatively, is it simply a question of a lack of perspective due to the lack of micro research into the East (and particularly China)? In other words, would the Venice case address issues that are ontological or perspectival in nature?

A similar micro view would also be beneficial in understanding China. If we accept the claim that China was once a maritime power and production power in manufacturing ships and industrial goods, which were once second to none in the world: the Ming Armada across the Indian Ocean with silk textiles, wall-papers, and porcelain for the export markets (Deng, 1997, 1999a). What is certain is that similar archival research is not currently available on ancient Chinese organizations (i.e. extensive reading of archival documents reporting discussions and questions in

¹³ Interestingly enough, even the Royal Tobacco Factory innovations introduced under Carlos III have nothing to do with the thesis, for this modernization was led by a Catholic king, in a Catholic country, coming from a previous Catholic kingdom etc.

¹⁴ Usually the term anomaly is used with reference to a specific explanation or theory; here the term is used in a broader sense, contrasting the archival findings of recent researches on the management of the Venice Arsenal in the turn of the sixteenth century, compared to what is normally assumed in accounting history.

running one single entity).¹⁵ Before investigating possible explanations for this lack of archive-based research and in case trying to identify suggestions for a possible research agenda, some general elements of the different institutional context that historically characterized the Chinese experience at the micro-level, need to be taken into account. This will assist in understanding the similarities and differences in growth trajectories and path dependencies.

We are addressing a new perspective for the Great Divergence Debate, calling for attention on a few broad issues that need further research according to our view: 1. How different was China in micro-business practices? First, Chinese firms were predominantly family ones which were owned and managed within a family/clan; second, genuine joint stock companies emerged very late in China (in the late 19th century). State-run workshops did exist but their number and output were very limited (no more than 10 percent in China's total GDP) in an overwhelmingly private economy. Only when joint stock companies arose, did these two sectors entwine for the first time. Such characteristics almost certainly shaped how micro management was conducted in China. The separation between ownership and person was absent, and as limited liability was underdeveloped, it made accountability less stringent in China (it proved unnecessary to clearly define the boundaries of the business entity, to give report etc.). As family/clan firms in China were built on having close personal relationships, a high degree of tacit-ness removed the need for detailed and transparent accounting (see Tong, 2009; Zheng, 2010). Such striking micro-level uniqueness deserves our attention. In comparison, in the Venice there existed the separation between the "principal" (the Senate of the Republic) and the "agent" (the Arsenal), each with its own identity.¹⁶

2. Our view is that differences in other business institutions, such as guilds, may serve as proxies for micro management. Particularly, the different nature of guilds – as State administrative units in China (Moll-Murata, 2006; Akien & Lu 1993a, 1993b; Fu 1971) vs. free economic entities in Europe (e.g. Epstein, 1998, 2008; De la Croix et al., 2016) – is likely to have played a major role in a micro-divergence process. At a general level, comparing guilds as they were in China as opposed to Europe, the more proactive nature of the latter in the long run seem to corroborate a revisionist position (Epstein and Prak, 2008): indeed the juxtaposition of guilds and innovation was not an oxymoron (MacLeod, 2008). Guilds in the West seem to have played a crucial role in the evolution of economic relationships when compared to Chinese ones which were often the

¹⁵ 'It is exceedingly difficult to construct reliable quantitative indices for the economic history of premodern China, given the unevenness and paucity of relevant statistics and quantifiable records on prices, wages, costs, incomes, resources, output, etc. for any period much earlier than the Republican era' Bryant, 2006: 421). On the issue of sources see also von Glahn, 2016: 6.

¹⁶ By the way, this seems to corroborate the role of State bureaucracies in the development of capitalism, despite the lack of explicit focus which is normally referred to (see also O'Brien, 1999a, 1999b).

extension of the state apparatus *per se* and whose autonomy was rare (see Kao, 1965; Moll-Murata, 2008).

The modernity of the Arsenal case at the turn of the XVI century is already the overtaking of a workshop or guild organization, though the process took time, and the Arsenal was a sort of hybrid organization for a while.

In Ming-Qing China, guilds were politically and ideologically overshadowed by the state due to the well-entrenched Confucian bias towards state management (or statecraft), Confucian mindset of social stratification (with the four layers made of the literati, the peasantry, artisans and merchants), and Confucian mistrust of artisans and merchants (Chen, 1911). As a result, guilds were *de facto* official organs to monitor and control artisans and merchants. In this context, it would be in the best interest of the artisans and merchants not to keep detailed accounting records in order to avoid political and business troubles with the state. If accounting mattered in the past, the possible implication could be that without accurate accounting technique, micro-level business efficiency suffered, hence the micro-root of the Great Divergence.

3. Writing within the administrative decision-making process is a crucial element. For instance, Chinese businessmen, seem to have relatively lower incentives to learn how to read and write, although they had to be numerate as required in doing business. This was largely the result of the Confucian class stratification. Usually merchants and their sons were not allowed to become officials or join the literati with full membership, even if they were well educated and active in donating to educational institutes (Zhang, Ma and Zhu, 2000; Tang, 2003). On the other hand, well-educated writers may not have been involved in business as professional merchants. In this regard, there may have existed a mismatch between a reasonable level of literacy and poor provision of business records in traditional China.

It would be interesting to compare the situation in the West at a more general level. Surely, compared with Venice and its environment, this is one of the huge differences. Writing seems to be a “normal” activity for many of the individuals involved in the Arsenal activity, either professionals or politically appointed figures. As Valeriani (2010: 117-53) reveals, Galileo himself was able to interact with some of the people inside the Arsenal about issues addressed by Aristotle on the Art of Navigation; and many people were “writing” in the context of the reports on the Arsenal which are found in the Venice archives, including professionals and technicians.

Indeed, the issue of “writing” is what constitutes one of the elements of interest of the Arsenal anomaly in two aspects. First, this is one of the earliest documentations in the West – so far at least – directly and thoroughly addressing issues of management in textual forms to be shared by a community of experts and “writers”. Second, there is a long tradition of extensive writings associated with the Venetian government (the State Archive in Venice consists of 62 kilometers of

shelves). Regarding the particular case of the Arsenal for the period in question, there is an additional dimension related to writing about management, i.e. the military concerns of the supply of 100 galleys. In a sense, this early example of text about management is almost a byproduct of other needs that dictated the managerial discourse.

Little is known about Chinese managers and how they worked. The reasonable assumption here is if someone with a merchant background sought a good education and consequently obtained Imperials Degrees he then joined the gentry class. This was common at least in the nineteenth century. With this social mobility-cum-self-selection, the majority of merchants who stayed on were almost certainly less educated. If so, what did low human capital do to micro-level management and its efficiency in China?

4. Numeracy with/without writing. Counting in itself, and technologies of counting, has such an important impact on the ways of calculating and managerial practices. Why a civilization decided to write and the other did not is one of the most fascinating issues (see for instance the extent of abacus diffusion even today). This can work as a hypothesis. However, with money, the group that cannot write should be able to hire someone who can. Indeed, ordinary members of the Chinese gentry were available for hire to perform a range of tasks (Chang, 1955, 1962). The question then becomes why and how Chinese merchants did not hire them for record-keeping.

5. The role of the state and its administration. Despite the ideology of “laissez-faire”, the role of the state in economic development has been addressed as one of the most important factors that enabled the capital accumulation that contributed to the whole take-off process (on the military underpinnings of the UK Industrial Revolution see O’Brien 1999a). In contrast, the history of the central state in China after the Song dynasty and the invasion from the Mongols and the Manchu was much weaker: a very small bureaucratic apparatus considering the size of the country, with minor impacts in the economic life inside the country (Deng G., 1999; Deng K., 2011).¹⁷ Interestingly, this applied for such a long period until the collapse of the Empire. Although characterized as more a commercial than a military power, the governing bodies of the Republic were vast in Venice, and so was the state.

Despite the many questions we are not able to provide answers to, the issues raised above signal serious differences at the “ontological level”: it is likely that businesses were run in significantly different ways in the two contexts. Yet, the lack of historical data about sophisticated practices in ways of managing could represent a perspectival issue as well. This will not be very different from what happened to the debate about the West, where a huge literature exists in

¹⁷ Quite ironically, von Glahn (2016: 10) comments: “During the late imperial era, China’s rulers embraced the neo-Confucian ideological abhorrence (not unlike that of neoclassical economics) to state interference in the private economy.”

mainstream historiography, yet lacking the specific lenses of organizing and managing as in the case of Venice and the “Venice anomaly”.

The lack of data/evidence is not in itself sufficient to argue that management practices did not show elements of modernity toward a construction of a body of knowledge and management discourses of some kind, whether similar to or different from what occurred in Venice at the turn of the 16th century. Given the presence of complex activities in China for such a long period (ahead of the West across many sectors, as acknowledged by the whole debate on Chinese civilization), it would be beneficial to discover documents that in one way or another represent discussions, controversies, decisions *querelle*, concerning the running of complex proto-industrial businesses.

Adopting a management and accounting history perspective in such research, we are not necessarily interested in actual innovations, revolutionary discontinuities in technology, production or distribution aspects. Rather, following March’s (1978) definition of management as addressing attention (a more sophisticated perspective rather than the practitioner way of defining management as “getting things done”) we are searching for reconstructing episodes, anecdotes, local contexts, all in a micro perspective. Whatever the outcome (in terms of innovations in ways of production for instance), we are interested in the throughput along the process and in analyzing the construction of a discourse about ways of organizing things. To achieve that, one needs to find a complex set of documents related to micro-level production activities. This is where our research agenda becomes particularly challenging.

E. Potential management discourse in economic history of China: ideas for a research agenda

Following the previous discussion, one in principle would ideally like to structure a comparison between Venice and Song China (960-1279), the first documented intensive growth in Eurasia, curiously referred to as the equivalent of the European Renaissance.¹⁸ During the “Song Economic Revolution”, China’s non-farming sectors boomed and their efficiencies improved (blind-quotation: ch. 6; Hartwell, 1962, 1966; Wagner, 2001). It is largely unknown what sort of micro-level business management made the Song Economic Revolution possible: again, the whole debate seems to share

¹⁸ “Miyazaki Ichisada, in his 1950 book *East Asia’s Modern Age*, linked the Tang-Song transition to the European Renaissance, both of which exhibited the secularization of society and culture and the rebirth of national philosophy on one hand, and the rise of cities, commerce, and the free disposition of property and labor on the other, that have become hallmarks of the modern world.” (Gahl 2016: 2)

a market driven focus¹⁹, ignoring the institutional, organizational and knowledge base of this development.²⁰ Unfortunately, the Song growth was ended by the brutal Mongol invasion and conquest, and the following periods never achieved the degree of development (especially in relative terms, towards the rest of the world) of the Song (“involutionary patterns”, as referred by Huang, quoted by von Glahn: 4). What particularly matters here is that the Song archives did not survive.

What we are facing in our ideal comparison is a serious informational asymmetry: we have abundant access to micro-level management primary sources for Venice (in its unique situation of high military pressures and internalized permanent production) but not for China. There is also an information asymmetry regarding China: we have some information of China’s macro-level growth and development, but little about how economic agents behaved in an industrial firm, particularly if related to the state bureaucracy.

Undoubtedly, China had official archives. All the dynastic histories serve as the hard evidence (Anon, 1986). However, it was standard practice that once the official history of a demised dynasty was compiled by historians of its succession dynasty, the official archives of that demised dynasty were to be destroyed, apart from “veritable records of emperors” (*shilu*) for political and ideological purposes. The only exception is the Qing Dynasty (1644-1911) because its official history has not been published to date.²¹ Yet, through triangulation with existing secondary sources it could still be possible to find some indirect evidence that complex situations, probably not any less challenging than what was happening in Venice in the 16th century, existed in China’s firms, too.²² This suggests that some forms of sophisticated knowledge to deal with managerial

¹⁹ “The increased output at many eleventh-century Chinese enterprises was stimulated by growing demands for ferrous metal products, which made it profitable for ironmasters to increase the scale of their operations and to adopt technological innovations which lowered unit costs.” (Hartwell, 1966: 33)

²⁰ The Western literature ignores the developments of accounting in China; in turn, unfortunately not that much of Chinese accounting history or research in general is available in English (for a couple of useful reconstructions of debates see Ji, 2000, and Chen & Chan, 2009). According to Aiken & Lu (1993: 163), at the time of Zhou dynasty, “accounting practice became more advanced than elsewhere in the world”; on the same line see also Fu, 1971. Indeed, accounting during the Tang and Song dynasties is said to have been quite sophisticated (Fu, 1986; Aiken & Lu, 1993a, 1993b). However, the few papers available in English tend to be rather abstract, without entering in details in the functioning of the accounting system. In any case, the contents of reports are rarely discussed in depth (see for instance the references to important reports during the Tang & Song period by Aiken & Lu, 1993a, which would be very beneficial to investigate in depth, sharing the analysis with the international community).

²¹ That should include clan lineage record keeping, e.g. Lee et. al., 1997.

²² Wagner research strategy is here interesting, also for our call for a research on the micro-foundations of the GDD. “There is no source which gives an overall description of the administration of the iron industry in the Song period, but

complexity must have been in place. In terms of internal organization, recording resources' allocation and measuring outcomes had to be imperative. At least some empirical evidence exists, and can already be recalled here.

F. Organizing people

According to Yang (1989: 136-38), the internal division of labor of the Longjiang Shipyard and the Qingjiang Shipyard was sophisticated. During the Ming-Qing Period (1368–1911) these two government-run shipyards developed matrixes for the internal division of labor to address the issue of co-ordination and optimization in production.²³ The former places emphasis on vertical synchronization, within a divisional structure to organize one hundred artisans in each of them (Rudder and Oar; Cable and Iron; Hull and Deck; Mast and Sail division). The latter focuses attention on the horizontal balance amongst eight departments (Weaving; Bamboo-Processing; Cable; Hull; Blacksmith; Sail; Putty), although the number of workers is unknown. A shipyard would employ several hundred artisans who were divided into either four or eight divisions. In the four-division model, artisans belonged to eight departments of carpenters, blacksmiths, coppersmith, cable-markers, weavers, sewers, lacquers, and decorators and were expected to move from one division to another (A to D) to perform various tasks in order to build different parts of the ship. In the eight-division model, workers performed less tasks but specialized in making particular parts of the ship. One could speculate whether a Chinese manager would choose the first model if he wanted to produce many ships quickly because his workforce was fluid or the second model if he wanted ships to be of a high quality because his workforce had specialized skills. Discussion and debate about managerial choices had to be a prerequisite.

Some major differences emerge at this level (even when focusing on the previous, more revolutionary period). “Ferrous-mining and metallurgical activity in eastern Shantung was carried on by local peasants, who were apparently organized into groups that resembled the so-called *arbeitsgenossenschaften*, or laborers' associations, described by Gustav Schmoller. According to the German historian, the decisive feature of these associations was discontinuity. Bands of workers came together for only a few days or weeks each year for the specific purpose of hunting, fishing, or some other joint enterprise.” (Hartwell, 1966: 41) Also, “In eleventh- century China, similarly structured peasant-operated mines and foundries were the

in the following a number of anecdotal sources will be considered which give glimpses of the industry as it could be seen at the local level.” (Wagner, 2001: 177)

²³ Unfortunately, the time reference – as it is common in the Chinese historical debate – generally refers to the Ming-Qing period, while for our kind of research questions, understanding what was the situation at the beginning or at the end of each of the two dynasties would be crucial. We still need also better information.

normal type of enterprise in eastern Shantung, and this organization characterized most establishments throughout the empire.” (Hartwell, 1966: 42) The institutional and social invention developed in Venice was the overcoming of the medieval form of organization, toward a permanent production entity.

G. Counting production flows

The Chinese management approach also suggests knowledge of input and output control. Different ship types and their production had to be identified and monitored. Table 1 hints at micro-level counting/tracking mechanisms in Chinese firms. For example, the Chinese manager had to know where his suppliers were to provide iron components to construct the hull and *tung* oil, lime and fiber from hemp/jute/ramie for caulking. He had to know where to obtain different types of timber and secure the supply in great micro-level detail in order to get his output.

Table 1. Standard Material Inputs in Shipbuilding under the Ming Government Regulations

Type/Material	Amount ^a	Amount ^b	Total
Transport ship (75 metric tons of loading capacity)			
China fir planks ^c	320	67.2 m ³	
Other wood planks ^c	149	31.3 m ³	
Tree logs	20	–	
Elm poles for rudders	2	–	
Chestnut wood planks ^c	2	0.4 m ³	
Unknown wood for sweeps	38	–	
<i>Sub-total of Timber</i>			98.9 m ³
Iron nails/rivets and wires	35,742 ^d	–	
Tung oil	3,012.8 <i>catties</i>	1,798 kg	1.8 t
Lime	9,037.8 <i>catties</i>	5,394 kg	5.4 t
hemp/jute/ramie	1,253.2 <i>catties</i>	748 kg	0.7 t
Warship (27.4 m long, 9.4 m beam)			
<i>nanmu</i> ^e planks (m) ^f	571	55.2 m ³	
China fir planks (m) ^f	865	83.7 m ³	
pine planks (m) ^f	467	45.2 m ³	
<i>Sub-total of Planks</i>			184.1 m ³
China fir poles for masts	2	–	
unknown wood for sweeps	8	–	
China fir poles for main sail frames	5	–	
wood poles for small sail frames	2	–	
China fir poles for bars	16	–	

China fir poles for flagpoles	16	–
elm poles for rudder	1	–
sandalwood poles for rudder control	2	–

Source: Xu 1502.

Note: ^a Quantity as recorded; ^b quantity converted; ^c the standard plank was x by 0.311 m by 2.18 m, with a minimum of 0.21 m³ (0.311 m x 0.311 m x 2.18 m) (Song Y. 1637/1978: 234–50); ^d iron nails/rivets and wires were counted by pieces; ^e *Phoebe nanmu*; ^f total length which should be multiplied by 0.311 m² to show wood volume.

From an organizational point of view, the practice of measuring outputs seems to be rather well developed, suggesting that the Chinese handling of these issues of production management can be traced back to the Northern Song Period. Moreover, the scale and scope were substantive, with thousands of ships built per year (see Table 2).

Table 2. Recorded Outputs, from the Song to the Ming

Period	Year	Total output	Average per year	Average per month
1. Unspecified ships				
Song	995-97	–	3,237	269.8
	1090-1100 ^a	–	3,000	250.0
	1114	–	2,500	208.3
	1165	500	500	41.7
<i>Subaverage for Song</i>			2,309	192.4
<i>Subaverage unspecified ships (1)</i>			2,300	192.4
2. Transport ships				
Song	1128	–	2,700	225.0
Yuan	1282	120	120	12.0
	?-1314 ^b	1,800	–	–
	?-1328 ^b	1,800	–	–
Ming	1403	525	525	43.8
	1405	1,180	1,180	98.3
	1412	2,000	2,000	166.7
	1442	350	350	29.2
	1451	180	180	15.0
	1460	1,200	1,200	100.0
3. Warships				
Song	1042	500	500	41.7
	1129	200	200	16.7
	1169	270	270	22.5
	1192	100	100	8.3
Yuan	1270	5,000	5,000	416.7
	1273	2,000	2,000	166.7
	1274-92	9,900	550	45.8

	(1274)	(800) ^c	(800)	(66.7)
	(1282)	(3,000) ^c	(3,000)	(250.0)
Ming	1372	660	660	55.0
	1451	440	440	36.7

Source: Song S. 1242, vol. 145: ch. “Shihuo Wushi”; Tuotuo 1345, vol. 175: ch. “Shihuo Shang San”; Song L. 1370: ch. “Shihuo zhi Haiyun,” “Shizu Jisi,” “Shizu Jiwu,” and “Shizu Jiba”; Bi Y. 1797: vol. 186; Xu S. 1809, vol. 145: ch. “Shihuo Zhi”; Sun G. 1989: 370; Wang G. Z. 1991: 38; Zhang X. 1991: 79-83.

Note: ^aA yearly quota fixed by Emperor Zhezong (1086-1100 A.D.) in 1090 A.D.; ^bthe starting period is unknown; ^cone-year figure, which is included in the 1274-92 period.

There were similar detailed records as shown by historians of that time (Xu in 1502; Li in 1370). Unless the Chinese managers had a strong sense of production control and management, such calculations were both unnecessary and not possible. It is true that these are merely “physical” metrics, without monetary values. However, the detail seems to be more developed than the Venice reports, at least till Molin in 1633.

H. Other data on the production process

In terms of causal links between ship sizes and ranges of voyages, conceptually more geographic discoveries led to more and larger ships. If one takes the passenger-ship ratio as a proxy for the ship size and hence quality of ship design and shipbuilding, noticeable progress was made between 1284 and 1412. This progress in ship design and shipbuilding coincided with the Ming multiple voyages to the Indian Ocean. Table 3 indicates expansion in the geographic scope of China’s sea-going activities from circa 893 AD to 1432. Before the Ming Period (1368-1644) Chinese fleets were based on coastal China. During the Ming, they began to have their bases in South Asia (Calicut) and Southeast Asia (Sumatra). Routine ship maintenance was very likely to have been carried out, outside China. This required management over a long distance.

Table 3. Recorded scope of voyages

Sea/Ocean	Season ^a	Wind	From ^b	To ^b	Day(s)
1. Tang					
East China Sea	July (893)	S.E.	China	Japan	14
South China Sea	-	-	Guangzhou	Sri Lanka	42
South China Sea	-	-	China	Persian Gulf	90
2. Yuan					
East China Sea	Jun. (1281)	S.E.	China	Japan	18
South China Sea	Nov.-Dec.	S	Guangzhou	Banda Aceh ^c	40

South China Sea	Nov.-Dec.	S	Guangzhou	Sumatra	40
3. Ming (Zheng He) ^d					
South China Sea	Sep. (1409)	S.E.	Jiangsu	Vietnam	10
Indian Ocean	-	-	Calicut	Red Sea	28
Indian Ocean	Oct. (1432)	S.E.	Sumatra	Calicut	38

Source: Sun G. 1989: 162-5, 294-6, 298, 338, 362, 379, 384-5, 407-8, 410; Zhang X. 1986a: 43; Gao 1987: 33; Zhang X. 1991: 160, 162-3, 165-6; Schurz 1985: 65. For Zheng He, see also Goodrich and Fang 1976: 195-8.

Note: ^aConverted into the Christian calendar. ^bIf possible modern names are used to indicate their locations today, which means that the regions only roughly match those in history. ^cIn the northwest tip of Sumatra, Indonesia. ^dIncluding his detachments.

Table 4. Passenger-carrying Capacities of Sea-Going Ships

Period	Year	Total passengers	Ships	P-S ratio	Index
Tang ^a	644	43,000	500	86	100
Yuan ^b	1284	15,000	200	75	87
Ming ^c	1412	28,640	63	455	

Source: ^aWei and Zhangsun 656 A.D.: ch. "Yangdi Ji"; Fan W. 1964-65, vol. 3-1: 282. ^bSong L. 1370: chs. "Ribei Zhuan," "Zhancheng Zhuan," and "Zhaowei Zhuan"; Ke 1920: chs. "Ribei Zhuan" and "Zhaowei Zhuan"; Chen B. 1606: vol. 5. ^cZhang X. 1986a: 72; Wang G. Z. 1991: 40.

The point is that along all the changes and achievements in ship design, shipbuilding and sailing abroad there must have been considerable changes and improvements in Chinese management, regarding (1) how to better train and organize workforce, and (2) how to better allocate and manage its capital, technology and material. Otherwise, the new growth and development in sailing would not be possible; and China's maritime ability would have stalled at the Tang level (Morse, 1926–9; Hatcher, 1986; Gordon, 1984a, 1984b; Howard et al., 1981; Mudge, 1986).

J. The Chinese State bureaucracy: material vs monetary system

In searching and comparing accounting practices in Western Europe and China, it is vital for us to understand the general management style in the Chinese bureaucracy. What stands out most is the very long-lasting method of taxation through collection in kind (typically textiles, grain, animal fodder, and *corvée* services). This approach began in the Qing dynasty (221–207 BC) and continued until the later Qing (Qing: 1644–1911), even during the alleged centuries of influx of foreign silver to facilitate tax reform during circa 1565–1815 (see Liang, 1980). So, a *material* balance was of

paramount importance in the government of finance, despite the fact that money was invented and used by the Chinese many centuries before the formation of the empire (see Liang, 1980). Such a non-monetary approach in government finance was deeply rooted in China’s state policy of physiocracy, where farming and food formed the backbone of the economy (see Will, 1990; Will and Wong, 1991; Deng G., 1999b). In practice, huge quantities of food and textiles were collected as government taxes, and then distributed as government payments (including salaries for officials, wages for artisans, living allowance for soldiers, and famine relief hand-outs). The clear advantage of this approach was that the basic needs and income of the state employees was guaranteed, without the shocks and price fluctuations of the market. In other words, the basic income of the state employees was automatically inflation-indexed. If so, prices were less useful.

The long history of taxes in kind reveals the nature of barter trade in China and how the imperial state and its command economy handled such a trade.²⁴ Moreover, institutionally speaking, China’s private landholding property rights (in either freehold or leasehold) and there consequent family farms resulted in large numbers of self-sufficient households that produced their own basic food and fabric to making a living. The monetized economy remained primarily an urban phenomenon, which never overtook China’s national economy as a whole.²⁵ When it came to the micro-level, workers were routinely paid in food and shelter, with a cash payment being optional. So, a worker’s wage usually had two components: wage goods and wage cash. The share of “wage goods” was always *higher* than the cash payment. The following data shows the practice during the Ming-Qing Period (Li et al., 1983). Yet, the Ming-Qing Period is commonly regarded as the highest stage of monetization in the history of the empire (Table 5).

Table 5: China’s wage payment structure (1)

Period	Value of ‘wage in food and shelter’	Value of ‘wage cash’
1573–1619	81.6%	18.4%
1628–1644	86.5%	13.5%
1861–1874	71.0%	29.0%
1875–1908	67.5%	32.5%

²⁴ Otherwise, if China had had an advanced monetary economy and an integrated domestic market, it would have been much easier to tax the public in cash. Of course, the advantage with taxes in kind was government revenues free from inflation and regional price differentiations. Logically, however, the state perpetual pursuit for such revenues only support the judgment that China’s domestic market economy was to a great extent barter-based.

²⁵ An optimistic estimate of the monetary proportion of China’s total Great Divergence during the late Qing is about half. If true, the use of money was optional especially in the primary sector (Deng, 2003).

Source: Zeyi, 1963: 97, 107.

In the case of 7,055 workers in the three state-run silk textile factories in the Lower Yangzi Delta (as of 1745), Jiangning (Shanghai), Suzhou and Hangzhou, the same pattern existed. The government paid a total of 30,877 *shi* of white rice or unhusked rice (one *shi* white rice = ±75 kg) each year as workers' wages in three factories (see Peng, 1963). As a result, a material balance sheet of food and shelter was used in these factories (Table 6).

Table 6. China's wage payment structure (2)

Workers' type	Payment in food in value	Payment in cash
Unskilled	75%	25%
Semi-skilled	67%	33%
Skilled	43%	57%

Source: Zeyi, 1963: 97, 107.

Such an approach seems to have had a profound influence on China's accounting practice: instead of counting monetary value or prices of inputs and outputs, the government and firms in China were likely to count and monitor material inputs and product outputs.²⁶ Later, we come across such a practice in China's government-run shipyards, providing the foundation of how government shipyards in China were managed and monitored: instead of their monetary values, material inputs (timber, nails, tools and so forth) and outputs (ships) were counted. Furthermore, because with the material balance approach all items were inflation-indexed, prices became optional; and because government-run businesses were not profit seeking, prices were not an issue most of the time. Occasionally, officials did record prices as a one off, however their behavior remains unclear. In which ways materials quantities were translated into values inside the accounting system is still not clear. Curiously enough, such an issue is overlooked in Chinese accounting history, despite the implications it must have had on accounting practices and the whole functioning of the accounting system. The preconditions that were at stake in the Venice Arsenal – and the learning itself linked to the accounting processes – were not present in this situation within

²⁶ Fu (1971: 41) himself recognize however that “although money had existed since the Shang dynasty (1766 B.C. - 1122 B.C.), funds consisted of both money and produce”. The main exception was China's traditional money dealers (*piaohao*) who ran monetized accounts. This was not because they served a highly monetized economy but because they were specialized with handling money in a small sub-sector of the economy in China.

the Chinese state bureaucracies, which deeply affected accounting evolution in the two contexts. This represents an important issue in the research agenda for international accounting history emerging from our paper.²⁷

A final comment relates back to the issue of archive keeping in pre-modern China (prior to 1644). In addition to what has already been pointed out in terms of destruction of archives and considering the material balance approach, even if all the dynastic archives had been preserved, there would have been a very good chance that there was no archive devoted to monetary accounting. This is supported by the fact that although the Qing state kept records of food prices on a regular basis (e.g. Kishimoto, 1997; Wang, 2013), a material balance was the dominant one in government taxation and granary management (Liang, 1980; Will 1990; Will and Wong, 1991; Liu, 2015). As a result, as most practitioners in the field of historical national income can testify, the vast majority of figures for pre-modern China are yielded from estimation or mere “guestimation” (Maddison, 2007; Liu, 2015).

K. Concluding remarks

A lack of reference to micro issues in the whole debate about the great divergence appears to be a perspectival issue more than (or at least in addition to) an ontological one. We do not have evidence so far to argue whether even at the ontological level relevant differences between the East and the West existed. The lack of interest in managing/organizing/accounting discourse relates more to a lack in attitude by historians rather than by differences in history itself.

Our current analysis is still unable – for lack of primary sources – to open the “black box” of the internal organization of permanent production in the Chinese context. In conclusion, we are not able to analytically investigate the specific elements of managerial practices in the Song period at this stage, as we were attempting to do in our comparison. While it is likely that the differences were huge considering the differences in the social and cultural contexts, and what we referred to as a different attitude toward a monetized economy, there are signals that the complexity in organizing during that period was a constitutive part of doing business, similar to what existed in the Venice Arsenal.

²⁷ Of course, in the profit-aiming private sector, the approach had to be different. For example, Pomeranz (1997: 20-5) presented a sizeable food-processing company Yutang (400 workers) in Jining City (150,000 residents in 1900), along the Grand Canal in late Qing throughout the Republican periods. Granted, the firm made continuous profit over time. However, even in the case of private business there is no evidence that it kept detailed accounts similar to those by the Venetians, not to mention that fact that the period during which the Yutang operated was already that of the early modern one in China. Foreign influence had to be already at present in society. In other words, the company was likely to be an early modern one instead of a genuinely traditional. Indeed, Pomeranz uses the adjective ‘traditional’ with reservation.

Although we are unable at this stage to provide adequate answers to our questions, the relevance of the questions themselves is nonetheless corroborated. We have addressed the issue of internal administrative coordination as an important missing link in the whole debate on the Great Divergence, opening up a completely new, and hopefully promising, perspective in this direction. Even without primary sources, by using triangulation with secondary ones – searching for glimpses, in Wagner’s (2001) words – encouraging suggestions are provided of the existence of organizational complexity even in early eras. The Song dynasty remains the best candidate, particularly for iron production but also for other sectors, including salt monopoly. More in general a possible research agenda would be considering the organization of the state itself and more precise attempts at reforming the state bureaucracy: the Fiscal reform of the Song dynasty, and the whole experiment of Wang Anshi’s reform (e.g. von Glahn, 2016: 236-42), including the establishment of examination and its evolution over time (Hartwell, 1971; Woodside, 2006). In that sense, a refocus of our research agenda could be targeted more precisely on the study of organizing of the state bureaucracy, under the specific lenses of micro analysis.²⁸

We are calling for attention to focus on a new research area, the intersection between the Great Divergence and literatures dealing with the micro and in particular the management and accounting domains. We believe we have addressed a crucial question, though we have, at this stage being unable to provide sufficient answers. This is consistent with this type of research and the nature of an opening-up or exploratory paper, where raising questions – and the questions actually arisen – is more important than providing answers. We hope that we have been able to provide some important elements of the contexts that could play a relevant role in the overall explanation.

A final point in our view deserves further attention in the future. The absence of an archive in China of a comparable value with the West (Venice in particular) in terms of distribution, amount of documents, periods etc. has been dealt with a sort of a mere “accident” of history, as a cause of difficult methodological issues for this kind of research. This deserves ad hoc investigation: to what extent archiving (and preserving the archives) is part of the different attitude, which is perhaps crucial in the differences in the evolution of different paths between the East and West is a further question in this research agenda. Is the 62 km of shelves still surviving at the Venice State Archive (as opposed to the lack of archives for China) an accident of history, or is itself part of the explanation of the Great Divergence?

²⁸ There is a curious analogy here with our research on the Venice Arsenal: the starting point was a debate between Venetianists (social historians, historians of architecture), without a specific understanding of administrative science, management and accounting. A need to read the available documents with the lenses of administration is here called for.

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