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THE DEVELOPMENT OF CHINESE ACCOUNTING AND BOOKKEEPING BEFORE 1850: INSIGHTS FROM THE TǑNG TÀI SHĒNG BUSINESS ACCOUNT BOOKS (1798-1850)

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ABSTRACT

Claims have repeatedly been made for the importance of double-entry bookkeeping ('DEB') for capitalism's development in the West, so it is valuable to explore the book-keeping and accounting practices of economically successful organizations elsewhere. Our paper reports our exploration into the original account books contained in the archive of Tǒng Tài Shēng ('TTS'), a substantial Chinese 'grocery / merchant-banking' business whose surviving books span a period from the late 18th century to the middle of the 19th century. The TTS archive is the most complete and integrated surviving merchant archive from before China's forced opening to the West in the mid-19th century. Our findings about its accounting processes and records (of which we give illustrations) shed critical light on the nature of indigenous Chinese bookkeeping and business organization and on the larger questions about Chinese commercial culture and the path of its development, for comparison with those about the West. We find no evidence in the surviving account books of TTS to support previous arguments in the literature that at this period Chinese accounting practice for successful businesses (must have) had its own 'Chinese double entry bookkeeping' ('CDEB') comparable to Western DEB.

[192 words]

KEYWORDS

Chinese accounting archives of late Qīng era; Chinese business history; Sūzhōu măzì; double-entry bookkeeping (DEB)

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1. Introduction: the significance of Chinese developments in bookkeeping and accounting before 1850

The recent rapid growth of China's economy has reopened historical debate about the prosperity of the Chinese economy before the clear arrival of Western influences, from industrial Europe and the US, in the later 19th Century. The debate that features most prominently revolves around the so-called 'Great Divergence' exemplified by Pomeranz's (2000) book with the provocative claim that living standards in 18th century China─at least in the advanced region of the Lower Yangzi─may be comparable to Northwestern Europe as late as the 18th century. A multitude of explanations have been advanced to explain the post-18th century divergence between China and the increasingly industrialized West, ranging from natural resources, to political institutions, to cultural tradition. Many of these arguments in the Great Divergence debate hearken back to Max Weber's arguments on the rise of capitalism (see Brandt et al. 2014 for an extended review).

One of the most intriguing of the Weberian statements, as later reinforced by Sombart, is on the rise of capitalism as inextricably linked to the development of rational bookkeeping or, more specifically, double-entry bookkeeping [DEB] in the West. Those arguments have been strenuously contested (e.g. Yamey, 1978, 1982; Gardella, 1982, 1992; Macve, 2002). However there have recently been several papers and books published which revive the Sombartian arguments in various forms (reviewed in Hoskin et al. 2016b). Relatedly, even before the Great Divergence debate, China scholars have long developed the argument that, while perhaps not achieving all the features of DEB, Chinese businesses and their bookkeepers/accountants over several centuries developed an indigenous form of 'Chinese DEB' (which we here label CDEB) that was needed for the development of the increasingly lively commercial and financial sector in China (see Gardella, 1992; Goody, 1996; Aiken and Lu, 1998; Guo et al. 2011; Ji & Lu, 2013). Hoskin et al. (2016a) review the literature to date on this argument and, while not challenging the adequacy of China's accounting for assisting the economic development it achieved, set forward reasons for doubting that there was a CDEB that was essentially comparable to Western DEB (of the kind first explained in print by Pacioli in 1494 (e.g., Macve, 1996)). They thereby contribute to undermining the Weber / Sombart thesis about DEB.[1]

What would 'essentially comparable' entail? While there are several subsidiary features of techniques of writing and processing the 'books' that may vary within medieval Western

[1] An overview of their argument is given in Macve, 2012.

bookkeeping systems (e.g. Sangster, 2016), the essence of the commercial accounting by DEB that captivated Weber and Sombart is that the rigid requirements for *completely* doubled entries (labelled 'debit' and 'credit' in the West) produce a 'closed system' (e.g. Mattessich, 2000, Introduction, p.13), that provides as periodic precipitates a Profit and Loss Account (income statement) and a Balance Sheet of assets and liabilities (see also Goldthwaite, 2015, pp. 618-9).[2] These financial statements are widely interpreted as summarising a business's progress and the state of its capital (cf. Macve, 1996). Claims have correspondingly been made that in China the processes of CDEB had indigenously evolved by the 17th-18th centuries to require *comprehensively* doubled entries and enable the preparation of corresponding statements of *jìn - jiǎo* ([进 – 缴] = 'income – expenditure')[3] and *cún - gāi* ([存 – 该] = 'assets – liabilities') respectively from the accounts in the *zǒngqīng* ([总清] = 'general clearing') 'ledger' (see e.g. Aiken & Lu, 1998). [4]

In this accounting debate, however, with a few limited exceptions, most studies which have made those claims for a CDEB have presented no systematic evidence based on careful demonstration from original Chinese accounting records—and none of the evidence presented is sufficient to demonstrate the emergence of CDEB.[5] Our current paper, while not directly addressing the arguments over how important was the role played by DEB in Western capitalist development itself (cf. Hoskin et al., 2016b), aims to throw light on the purported significance claimed for CDEB

[2] In this view (which we share), although the presence of integrated real, personal and nominal accounts may be the most significant medieval development in bookkeeping technique, nevertheless, as the nominal accounts (e.g. for sales, purchases, expenses) are conceptually only temporary subdivisions showing the sources of changes in equity, they do not add to the underlying logic of the 'closed system' where Equity = Assets – Liabilities (as Mattessich, Introduction p.13 observes). Accepting this view it is not necessary to follow Sangster (2016) in regarding a necessary step in the evolution from single-entry to DEB as having been via what he labels an intermediate stage of 'dual entry' (i.e. where there are reciprocal or 'doubled' entries —e.g. for credit transactions and their settlement—but the *location* of the corresponding account in the books is not identified) as it is the *cross-referencing* of each side of the entry *to identify the location of the corresponding account* that he regards as crucial for there to be fully developed DEB. (The medieval evolution of such indexing and ordering of books is traced in Hoskin & Macve, 1986.) It is clear that Chinese accounting, as described by previous researchers and as also illustrated by the TTS records (see section 4 below), did not have the indexed and page-numbered books that Pacioli recommends and that are needed to satisfy Sangster's criterion—but we would not regard this technique as essential to what Mattessich correctly identifies as the 'logic' of DEB; and we would accept CDEB as having the essential features of DEB *if* it could be shown that there was indeed integration across the three stages of the books that we discuss in section 2 below (as has been claimed by other authors for Chinese accounting, e.g. Aiken & Lu, 1998) as this would achieve Mattessich's 'closed system' and provide the feature of DEB that has generally been regarded as the most significant, i.e. its ability to systematically track 'profit' and 'capital' (albeit that it is not the only method by which this can be done). However no first-hand evidence of such CDEB is available and we shall argue that it cannot be found in the TTS archive (see section 4 below) which only shows evidence of 'doubled' (i.e. Sangster's 'dual') entries where these are required for credit transactions but not of full double-entry according to either Mattessich's or Sangster's criterion.

[3] Unlike most previous authors, we have standardized the presentation of Chinese terms and their translation, wherever possible, using the format: *pīnyīn* ([拼音] = 'standard modern Romanized spelling with tone marks') or equivalent, at least at the first time they appear, as an aid to reading by those not familiar with Chinese. Recognising that Chinese nouns do not distinguish 'singular' and 'plural' forms it is possible to translate e.g. *zhàng* [账] as either 'account' or 'accounts'.

[4] The appropriate translation of all these accounting terms is discussed further in Hoskin at al. (2016a).

[5] Hoskin et al. (2016a) review the very limited surviving examples of evidence from Chinese accounts before the 20th century that have been discussed by previous authors. Surviving Korean records of the Mun Clan Association from 1741-1883 are discussed and illustrated by Jun and Lewis (2006). The history of Japanese accounting is surveyed in Kudo and Okano (2011).

in Chinese development by reporting in English our recent archival investigation of the original records found in the Tǒng Tài Shēng [统泰升] (henceforward TTS) archive of business account books (1798-1850), which as we show later, represents the largest and most complete surviving set of merchant accounts before China's forced opening to Western imperialism in the mid-19th century. This period almost exactly spans the reigns of the Qīng [清] emperors Jiāqìng [嘉慶] (1796-1820) and Dàoguāng [道光] (1821-1850).[6] Our current paper focuses on the technical features of the bookkeeping and accounting in TTS accounts and their possible business uses and discusses possible interpretations and implications in light of the wider debates on CDEB in China and DEB in the West.[7]

Our research does however face some limitations. As discussed further below there are gaps even in this unprecedentedly rich archive and we cannot be sure what kinds of records are missing. As we will seek to argue here that the TTS account books do not support the arguments by previous scholars that CDEB had indigenously evolved by this time, clearly it is possible that the missing evidence could be in the account books that are known to be missing from the archive (and indeed there could even be other account books that never found their way into it). And although we do know about the archival history of TTS (Ma & Yuan, 2016), we have no original complementary records such as correspondence, minutes of meetings, contracts etc. available to explain more of the business context, such as exist in many surviving Western archives (e.g. Fleischman et al. 1995; Fleischman & Macve, 2002, 2012; Matringe, 2016). Nor are there contemporary accounting manuals to give guidance (cf. Stoner, 2011; Edwards, 2015).

However we shall maintain that the surviving evidence—constituting the largest and most complete archive found to date— is at least not inconsistent with our view (while no first hand evidence has so far been cited in support of the conventional views about CDEB at this date) and moreover that, given the form and contents of the vast range of the 437 TTS books of various kinds that we have been able to examine, it is unlikely that there would be no clues therein to the existence of the kinds of other records that would complete a CDEB system if there had been one.[8]

Section 2 briefly reviews the main historical features of Western and Chinese bookkeeping procedures to set out a conceptual framework for examining the TTS accounts. In Section 3 we set out the background to the TTS business. Section 4 gives in detail what we see as the key features of the TTS books. Section 5 summarizes the major insights into the significance of the TTS books for

[6] It was only after the first Opium War of 1842 that extensive Western influence began to permeate Chinese institutions via the new 'treaty ports' (e.g. Brandt et al., 2014).
[7] For other work based on the TTS accounts, see Ma & Yuan, 2016 on the archival history of TTS; and Yuán & Mǎ, 2010 (*in Chinese*) and Ma & Yuan, 2012 on quantitative data on prices and exchange rates.
[8] In the case of early Western DEB books scholars have generally had to deduce how the whole system worked largely from individual books (and sometimes only fragments) that survive in incomplete archives (e.g. Goldthwaite, 2015, p. 618).

the history of Chinese bookkeeping and accounting and for Chinese economic history. Section 6 concludes and offers suggestions for future research priorities.

2. Western and Chinese Bookkeeping Procedures

The purposes of keeping accounts generally fall into three main categories: a) an aid to memory of the transactions that have taken place and the resulting assets owned and liabilities incurred which also allows for internal checking as a precaution against embezzlement of assets, particularly cash; b) profit calculation as a basis for settling up and sharing out the results of activities with other parties connected by contract or other accountability relationships (and thereby also incentivising performance, cf. Ogura, 1982); and c) providing relevant measurements as a basis for collecting information to guide decisions about better management and future business development (or curtailment) as well as information relevant to external investors (e.g. Macve, 1980; cf. Macve, 2014; 2015).

While it can be argued that accounts in many forms can assist with all these purposes, modern Western accounting generally utilises the DEB system. When books were still kept by hand the three stages of Western DEB, as explained by Pacioli in 1494 (von Gebsattel, 1994), were the 'memorial', the 'journal' and the 'ledger'. The first two were chronological and (ideally) the journal would be written up frequently from the rough record of transactions that had been noted as they occurred in the memorial (or 'waste book'). The journal identified the two accounts to which the 'debit' and the 'credit' entry would be posted in the ledger. From the balances of the classified ledger accounts periodic summary statements—the 'profit and loss account' and the 'balance sheet'—could readily be prepared. The set of the books and the resulting financial statements was therefore self-contained and complete in itself, with full internal cross-referencing of entries to enable easy checking or auditing.

But as we shall see when we turn to compare the Chinese books of TTS one needs to remember first, the caveat that DEB may generally be sufficient (provided all relevant transactions and events are included),[9] but is not necessary, for helping to achieve the three objectives of accounting (e.g. Macve, 1996); and second, that the tripartite classification of books into memorial /journal/ ledger is not a rigid requirement for the DEB system to work. In particular we should note that, while the conceptual distinction between the three stages is clear, in practice (and particularly now in modern electronic systems) individual Western DEB books may achieve more than one function and thereby economise on accounting effort.

[9] And of course no others mistakenly or fraudulently included.

The classic example is the cash book which can constitute both the cash section of the journal and the ledger account for the asset cash.[10] Other specialized day books, e.g. for sales or purchases or categories of expenses, may be utilised in a similar way. Thus a 'sales journal' (or 'sales day-book') is kept chronologically but the total of sales for each accounting period therein also provides the amount that would appear in the 'sales' account in the ledger, so the latter may be dispensed with and the DEB 'trial balance' achieved simply by including the cumulative balances on such specialized day-books alongside the balances in the ledger accounts proper.[11] Correspondingly the main 'journal' will be reduced to dealing only with special transactions and account transfers, etc.. Again, while the busy Renaissance trader may only have had time to keep a rough 'memorial' of transactions during the day's business, to be written up carefully in 'debit-credit' journal form (ideally each evening but at least say each week),[12] the increasing employment of specialist accounting clerks (and later of improved processing technologies) could allow the merging of 'memorial' and 'journal' so that posting to the ledger could be made from just the one kind of organised book of 'prime entry'. Another technique to assist the division of accounting labour and keep the size of manual DEB books manageable is to have 'control' accounts—e.g. for total trade debtors and total trade creditors—in the ledger proper, with the individual customers' / suppliers' accounts kept in 'memorandum' books (the total of the balances on which should agree with the balances on the respective control accounts in the ledger).[13]

The combination of these two techniques will result in, for example, the sales journal / day-book representing *all three* stages of Western DEB's structure: chronological memorial book of prime entry; journal (as the periodic total of sales therein must constitute what would be credited in a 'nominal' ledger account for 'sales'; and the individual sales must be debited either to cash, or, if on credit, to customers' accounts and/or to the sales ledger 'control' account); and the 'nominal' ledger account for 'sales' itself which can be incorporated in the 'trial balance' and transferred into profit and loss account and thereby into closing capital. Thus the various processing methods adopted in DEB will largely reflect the accounting technology of the time (manual, mechanical, electronic) and the associated processing costs.

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[10] Goldthwaite (2015, p.627) notes that because the cash book was often kept separately a cash account often does not appear in early Florentine DEB ledgers which thereby do not themselves fully balance (although the system as a whole does).

[11] As Stoner (2011) explains sales were alternatively recorded not in a 'nominal' account (as they are today and could also be in early DEB as implied e.g. by Goldthwaite, 2015, pp. 628-9) but by crediting the proceeds to the 'real' accounts for the respective merchandise items/classes as suggested by Pacioli in 'chapter 37' (von Gebsattel, 1994, p.92; p.119), requiring inclusion of a 'closing balance' if profits to date were to be reckoned before all the goods had been sold. See also Yamey (2000). However we cannot identify any 'real' merchandise accounts in the TTS books although there are chronological account books for various types of goods sold (as discussed in section 4 below under 'intermediate books').

[12] Pacioli recommended 'every 4, 5 or 8 days, more or less' (von Gebsattel, 1994, p.51).

[13] Although not described in Pacioli's 1494 exposition of DEB, de Roover (1956) has shown that such control accounts were already in use in Italian DEB books for some time before then.

These ambiguities in the classification of DEB books mean that, without knowing the full system being employed, it is often difficult for a researcher to deduce just from a particular account itself precisely what is its role in the system (e.g. Hoskin & Macve, 2000). Where a fairly full set of historical books of a Western merchant or industrialist survives, the interrelationships can often be adequately reconstructed─albeit sometimes only laboriously (e.g. Fleischman & Macve, 2012). Guidance may also be available from the many popular accounting manuals and treatises circulating at the time (cf. Stoner, 2011; Edwards, 2015), or by comparison with other contemporary archives.

When we turn to Chinese bookkeeping, the main features claimed for CDEB─as they have been described e.g. by Guo and Zhao in Chinese (referred to in Guo *et al*., 2011) as well as by several authors in English (but contested by Hoskin et al., 2016a)─seem at first sight to parallel the three formal stages of Western DEB ('memorial / journal / ledger'). The supposedly corresponding Chinese bookkeeping stages have been labelled 1) *cǎoliú* ([草流] = 'rough flowing') ; 2) *xìliú* ([细流] = 'refined flowing') and 3) *zǒngqīng*([总清] = 'general clearing') respectively (see e.g. Aiken & Lu, 1998). Like the 'memorial' (or 'waste book') and the journal, the first two are kept in chronological order (*liúshuǐzhàng* [流水账] = 'flowing accounts'), while the third classifies entries into 'assets' and 'liabilities', such as customers' credit accounts. Below, we turn to a detailed examination of TTS based on these criteria.

3. The Tǒng Tài Shēng (TTS) archive of business accounts

TTS's main business was situtated in Dà Liǔ [大柳], a smaller market town in Níngjìn county [宁晋县］of Héběi [河北］province during the Qīng dynasty (currently a county of the Prefecture Dézhōu Shì [德州市] in Shāndōng [山东] province). It is about 240 kilometres south of Běijīng [北京], close to the border of Héběi Province east of the historic Grand Canal. The records we have studied indicate that over ten branch stores of TTS were spread across a couple of nearby market towns, such as the Cháng Wān [长湾] and Chái Hú [柴胡] branches, each within about a 10 kilometres radius of Dà Liǔ. TTS combined its grocery business with money-lending, as is common in the history of merchant-houses in many countries (e.g. Ogura, 1982; Ziegler, 1988).[14]

Based on our estimates from the account books, the annual average volume of transactions at TTS would rank in the category of a medium sized business for the average size of merchant firms in Shāndōng province during the 18-19th centuries.[15]

[14] See Ma and Yuan (2016) for more detailed information on the history of TTS's business and of the TTS archive. Although it is difficult to express in modern day equivalents, at its peak TTS's annual profit would probably support about 20 lifestyles of the kind enjoyed by a middle level farmer's or a village school teacher's family.

[15] According to Xǔ Tán's classification of large, medium and small scale businesses, the medium were the most numerous ranging from 35% in the reign of Jiāqìng (1796-1820) to 57% of the total number of firms in Dàoguāng's reign (1821-1850). See Xǔ, 1998 (*in Chinese*), pp. 186-187.

The available accounts in the TTS archives that we are able to identify add up to a huge total of 437 volumes for the period of 1798-1850 (see Table 1 below) although the actual number of original account books donated by the Rong family in 1935 to the library in Beijing overall totalled 475 volumes.[16] We are reasonably confident that amongst the possibly millions of original merchant accounts that survived, none rivalled the completeness and integration of the TTS accounts as a single set for the period before mid-19th century China. In this regard, the TTS archive offers us a unique opportunity to examine Chinese accounting tradition in several aspects. For example, unlike some of the works that have relied on accounts recorded in the late 19th or early 20th centuries, such as the *Zìgòng* [自贡] mines accounts examined by Auyeung et al. (2005) or the *Ruìfúxiáng* [瑞蚨祥] merchant accounts examined by Gardella (1992), the TTS records are from a rural Northern Chinese market town between 1798-1850 before there was any visible influence in China from Western accounting ideas and practices. While laying no claim to TTS's accounting being either representative or being the most sophisticated of traditional Chinese merchant accounts, the fact that we have tallied 437 of the total 475 volumes gives us a unique opportunity to examine the internal structure of a Chinese accounting system such as the layout, posting, transfers of accounts, the different numerical systems used, and the preparation of financial statements, etc..

4. Tǒng Tài Shēng (TTS) Business House account books: classification and accounting system

Over a period of some 50 years, starting from the end of the 18th century, we can see an incremental elaboration in the TTS accounting system in its main store in Dà Liǔ, although the smaller branches like Cháng Wān continued to keep very simple books throughout the period. The TTS account books still followed the traditional Chinese single-entry system, which emphasizes particularly cash income and expenses, where there is basically only one entry for each transaction (unless it is on credit where the necessary corresponding record—i.e. doubled entry—in the customer's /supplier's account is also made).

Physically the books are light in weight with paper bindings (normally a soft blue cover with red identification strips glued on), approximately 20cm square and approximately 3-4 cm thick. They are string-bound and handwritten with a classical brush pen. We have seen some later ones with printed ruled pages. Pages are not numbered or indexed.[17]

We do not know how the accounting function was organized or how many people were involved. Gardella (1992) presents the organization of the *Ruìfúxiáng* [瑞蚨祥] store in a later

[16] The unusual preservation of this merchant archive throughout the past seven or eight decades and its historical significance provides fascinating insights into the dramatic changes in the political and social environment from the eras of the late Qīng through to the Communist era under Mao Zedong and Deng Xiaoping, an issue more fully explored in Ma & Yuan (2016).

[17] Pacioli emphasised the need for page numbering and indexing in a DEB ledger (von Gebsattel, 1994, p.55).

period and, adjusting for scale, one may presume TTS would have similar organizational features. In the original account book of the sales counter, also called the *cǎozhàng* ([草账] = 'rough account') or *yuánzhàng* ([元账] = 'primary account'), the counter assistants recorded the transactions of cash and goods every day, for the further categorizing and internal auditing by the counting house. We have attempted to classify the extant account books of Tǒng Tài Shēng (Hào) [统泰升号, i.e. the main store] into four levels according to their contents and apparent functions, of which Levels 1 to 3 broadly map onto the classification illustrated by Aiken & Lu (1998)—and likewise by Ji & Lu (2013)—and correspond in concept to the three key levels of DEB books (memorial / journal; ledger; resulting financial statements). Level 1 is books of daily original entries (broadly corresponding to the memorial and journal in the DEB system); Level 2 is accounts for customers and suppliers, for borrowers and lenders and for sales and purchases of goods (broadly corresponding to ledger accounts in the DEB system) and Level 3 is the summary financial reports prepared from the accounts (although in TTS these appear to be based on the account books rather than an integral part of them, unlike in the DEB system). Level 4 comprises other miscellaneous unclassified accounts.

We construct a matrix in Table 1 according to decades and the four levels as described above for all 437 TTS volumes which survive for the period of 1798-1850.

Table 1. The Existing volumes of the Tǒng Tài Shēng Merchant Accounts by decade and level[18]

	Level 1	Level 2	Level 3	Level 4	Level Unclear	TOTAL
1798-1810	10	48	1	6	2	67
1811-1820	4	43	0	5	2	54
1821-1830	19	51	1	15	0	86
1831-1840	19	52	10	23	0	104
1841-1850	33	44	5	17	1	100
Year Unclear	4	7	0	5	10	26
TOTAL	89	245	17	71	15	437

Note: Except for five volumes archived at the Institute of Economics of the Chinese Academy of Social Sciences (CASS), all are in the National Library in Beijing.

As is shown below, this four level classification could be somewhat ambiguous when mapped onto the TTS accounts. As a close illustration, we provide a detailed categorisation in Table 2 of the surviving account books for the year 1844 for which the largest number of TTS account books surviving for any one year—totalling twenty—is found.

[18] Each account book has been categorised at one level but as discussed in the text many of them span more than one (see examples in Table 2 where the additional levels they span are included in parentheses).

Table 2: Tǒng Tài Shēng account books for 1844 (Dàoguāng 24th Year)

Month/date	Account book	Level
June 2nd	Day book of copper cash (出入钱流水账)	1
Sept. 7th	Day book of copper cash (出入钱流水账)	1
12th Nov.	Day book of copper cash (钱出入流水账)[19]	1
29th Dec.	Day book of copper cash (出入钱流水账)	1
1844	Day book of silver (出入银流水账)	1 / (2)
Jan.	General account book of North-eastern villages (东北乡总账)	2
16th Oct.	General account book of North-eastern villages (东北乡总账)	2
Jan.	Old account book of North-western villages (西北乡老账)	2
Jan.	Old account book of South-western villages (西南乡老账)	2
16th Oct.	Account book of South-eastern villages (东南乡账)	2
Jan.	Old account book of South-eastern villages (东南乡老账)	2
1844	Trade account book of West Town (西镇交易账)	2
Jan.	Trade account book of Home town (本镇交易账)	2
Jan.	Account book of 'four streets'[20] (四街账)	2
16th Oct.	Old account book for trade with residents (宅户交易老账)	2
1844	General account book on interest trading (利息交易账)	(1) / 2
Jan.	Old account book for public ceremonies (公仪老账)	4
1844	Old account book on daily use of strung coins (日用串钱等项老账)	(1) /(2) / 3
1844	Temporary old account book on trade (浮记交易老账)	(2) / 4
2nd Nov.	Extended temporary old account book (绪浮记老账)	(2) / 4

Notes to Table 2:
Level 1 represents the category of books containing original daily accounts (*liúshuǐzhàng* [流水账]) discussed in this paper, including *cǎozhàng* ([草账] = 'rough account') or *yuánzhàng* ([元账] = 'primary account') (so there is no distinction here corresponding to Aiken & Lu's (1998) division of the chronological records into *cǎoliú* and *xìliú* or to the division between 'memorandum' and 'journal' in DEB—see section 2 above).
Level 2 represents the category of books containing secondary classified accounts: *zhuǎnlù zhàngbù* [转录账簿] or *ténglù zhàngbù* [誊录账簿] (both = 'transcribed account book') (corresponding to Aiken & Lu's (1998) *zǒngqīng*). It seems implausible that there would be so many books apparently of 'old' balances; perhaps more likely is that 'old' (*lǎo* [老]) here refers to a 'familiar' or 'respectable' account, both common usages of the word in modern Chinese.
Level 3 represents the level of summaries of financial results and financial position.[21]

[19] The covers of these books were not standardized at this time. Both of these Chinese titles were used and there is no difference in meaning between the alternative order of the Chinese words (*chūrùqián liúshuǐzhàng* or *qiánchūrù liúshuǐzhàng* (literally 'out in copper cash flowing account(s)' or 'copper cash out in flowing account(s)')).
[20] i.e. residents of the surrounding locality or 'round here'.
[21] As discussed in the text below under 'Intermediate books' and 'Level 3', the Level 1 'strung coins' books also serve the purpose of providing Level 2 classified information and their totals provide Level 3 summary information. There is no Level 3 *yìběnwànlìzhàng* ([一本万利账] = 'account that makes big profits with a small capital') in the extant TTS account books for this year: the first book covers 1801 to 1825 and is categorised in Table 1 as belonging in 1801; the

Level 4 represents the ‘unclassified’ miscellaneous category: such as *záxiàngzhàng* ([杂项账] = ‘accounts of miscellaneous items’) or *fǔzhùzhàng* ([辅助账] = ‘ancillary accounts’).

Note that all dates listed from the original account books follow the Chinese lunar calendar (i.e. what we label ‘January’ is actually the first month of the lunar year *zhēngyuè* [正月] which varies between Jan-March). 1844 is the 24th Year of Dàoguāng [道光], the sixth Emperor of the Qīng Dynasty (who ruled from 1821 to 1850).

second book covers 1825-1843 (but with a long gap between 1832-1841) and is categorised in Table 1 as belonging in 1825.

We now turn to a detailed description of the accounts kept at each of the four levels:

Level 1. Books of daily original entries

There is no clear segregation for different kinds of transactions in TTS's early *liúshuǐzhàng* ([流水账] = 'flowing account' books or daybooks: '*liúshuǐ'* account books henceforth). They contain not only the purchases and sales of goods on credit but also money transactions (including loans at interest), as well as daily expenses of the main and branch shops. In the account book the transaction entries contain a variety of information: the shop's business transaction, and the nature of customers' purchases, deposits or debts. Later, specialized *liúshuǐ* account books also emerged for the main store such as the account book for goods sold, account book for purchased goods, account book for daily expenditure inside the shops, and account book for interest on loans. Despite the gradually increasing specialisation of division between different account books, which reflects the business's expansion and improvement in accounting methods, the bookkeeping methods of these account books continued to resemble that of the earlier simple general *liúshuǐ* account book that continued to be used in a branch such as Cháng Wān. This category of *liúshuǐ* account books occupies a large portion of TTS account books; and they are mainly day-books that keep transactions of copper cash and silver. Picture 1 provides a photo of a simple *liúshuǐzhàng* from Cháng Wān branch that records the daily purchases of commodities by clients. As can be seen in the picture and detailed accompanying notes, the account page starts with month and date, and then records the detailed transactions of types and units of commodities purchased by the client. While unit prices are not normally shown in the day-books (as in this particular example), they were sometimes recorded especially perhaps when prices were changing significantly. Usually, on the cover page of this set of account books (not shown here) is indicated the starting date (year and month) of the bookkeeping period, e.g.: 'constructed in Jiāqìng [嘉庆] 13th Year, first third of *zhēngyuè* [正月]' i.e. in the first division of the first month of the lunar calendar.

Insert Picture 1 here

The early account books do not actually make a distinction between silver and copper cash. Instead, silver and copper cash are kept together in a *chūrù liúshuǐzhàng* ([出入流水账] = 'daily account of payments and receipts') or in a *chūrù yínqián liúshuǐzhàng* ([出入银钱流水账] = 'daily account of silver and copper payments and receipts'), in which silver income and expenses are also recorded at the equivalent amount of copper cash according to the day's exchange rate. In periodical balancing the cash flow is checked by *liúshuǐ jiécún* ([流水结存] = 'balancing the day book') e.g. at the five or ten day divisions of the lunar month, or on market days and, in some cases, daily. Silver

and copper are balanced separately; silver is also converted into copper cash at a (fluctuating) exchange rate, in order to get a total balance in terms of copper cash, as copper cash was the medium predominantly used in North China during the Qīng period and served as the monetary standard─the *numéraire*─in bookkeeping. In the later period of the TTS account books, when there was a much more frequent usage of silver, the copper and the silver transactions are kept in separate account books for the convenience of management and checking / internal auditing, but with the silver amounts still converted into copper equivalents presumably for subsequent accounting purposes, especially at Levels 2 and 3.

In Picture 2, we show a photo of this type of *liúshuǐzhàng*—a silver account—with detailed accompanying translation notes to a section from the lower (outgo) half of the page.

Insert Picture 2 here

In this silver account book, on each page[22] each (vertical) line is divided into upper and lower halves, with dates respectively. The upper half normally records only the incoming receipts of money (silver in this case but also converted into copper cash) from the clients; the lower half keeps the outgoing payments only. The upper and lower halves are kept strictly separate, presumably to aid internal checking and they share this feature with DEB books (where the equivalent 'Venetian' division is horizontal: von Gebsattel, 1994). When recording silver transactions, *píngsè* ([平色] = 'the weight and purity' of a silver ingot) and the type of silver (minted *sycees*,[23] coins, or unminted) as well as the daily exchange rate (between silver and copper) are also recorded, so that silver can be converted to its copper cash equivalent.

As can be seen in the explanatory notes to both of these sample account pages, in the case of a cash transaction which is immediately cleared, the entry only keeps the incoming or outgoing amount of silver (or copper) in terms of money, or the outgoing sale of goods in terms of quantity; the name of the trade partner is not recorded. If, however, the silver / goods transaction is on credit,[24] detailed records will be made such as the trading partner (name of the person or the business house). These records can therefore be easily transferred into the next level of account books, such as the *wǎnglái* ([往来] = 'individual customers' accounts'). In a *liúshuǐ* account book,

[22] The whole page is shown as an inset in Picture 2.

[23] This is silver minted into the traditional boat-shaped ingots called *sycees* (e.g. https://fapghostwriter.wordpress.com/insight/sycee/ [accessed 12.09.2015]), referred to by TTS as Bao Silver (*bǎoyín* [宝银]).

[24] *Wǎnglái shōufù* ([往来收付] = 'reciprocal receipts and payments with a trading partner'), i.e. trade on credit with a long-term partner (normally other shops). Those shops sometimes purchase with credit, or pay for purchases with a surplus (pay more than the price of the goods), which will be used for next purchase. An individual account is set up for each of these customers, called the *wǎnglái* [往来] account. (See Pictures 3 and 4.)

transactions that need to be transferred to the *wǎnglái* will be marked by *guò* ([过] = 'transfer') or *zhī* ([之] = 'go') at the end of the detailed item. Transactions that have already been cleared will be marked *qīng* ([清] = 'cleared') or *liǎngqì* ([两讫] = 'ceased at both ends'), indicating that the credit item has been cleared, and there is no longer any need for transferring the entry to other specialised account books.[25] When the *liúshuǐ* accounts were balanced (e.g. every five days or at the end of other periods), the balance stated the total sum of outgoing money and incoming money, and the current asset balances of copper cash and silver.

'Intermediate' books

In many cases these retain the form of daybooks but their gradually increasing specialisation allowed the ready accumulation of totals for different aspects of the business activities so they can be classified as also acting more like 'transferred ledgers' i.e. they span the Levels 1-2. The original general *liúshuǐ* account books of the earlier years included these contents that would later be divided between specialized account books as listed below. Therefore some of those early general *liúshuǐ* account books should also not be taken just as *yuánzhàng* or *cǎozhàng* ('rough' or 'primary accounts'), but also be classified as spanning the Levels 1-2. For later years, where there is no original general *liúshuǐ* account book that includes the contents of the other more specialized account books, those specialized accounts books were also being used to originate the bookkeeping of those specialized transactions, and so they should also be seen as also acting as *yuánzhàng* or *cǎozhàng*, i.e. they also span the Levels 1-2. As argued below they could also be used for the purpose of Level 3, i.e. the preparation of summary periodic accounts (c.f. the discussion in section 2 above of the multiple roles of e.g. a 'sales journal' in the DEB system).

- *Mǎihuò zǒngzhàng* ([买货总账] = 'general account for purchased goods'), also called *rùhuò zǒngzhàng* ([入货总账] = 'general account for incoming goods'), is a daily record of the number and price of incoming goods, and of the *pánfèi* [盘费] or *lùfèi* [路费] (= travelling expenses) and the *jiǎolì* ([脚力] (= transportation expenses) for each purchase.
- Accounts like *màixiàn zhàng* ([卖线账] = 'account on sales of yarn'), *màidòuyóu zhàng* ([卖豆油账] = 'account on sales of bean oil'), *mài yóubǐng zhàng* ([卖油饼账] = 'account on sales of seed cake'), *mài (mián) huā zhàng* ([卖（棉）花账] = 'account on sales of cotton'), *mài dòuzi zhàng* ([卖豆子账] = 'account on sales of beans'), *màizi zhàng* ([麦子账] = 'account on wheat'), *hónggāoliáng zhàng* ([红高粱账] = 'account on sorghum') are sales accounts for some specific merchandise. The reason for keeping individual specialized

[25] Alternatively the whole account may just be circled as shown in Picture 3.

account books could be that these items might have a concentrated period of sale, or represent a particularly large scale of selling, so their separate classification was found useful.[26]

- There are also some books for accounts like *yuànlǐ shǐyòng zhàng* ([院里使用账] = 'account for in-house expenses'), *zhīshǐ zhàng* ([支使账] = 'account for the delivery expenses'), and the book for the daily expenses of the shop, which keep record of the daily living expenses of the shop assistants, as well as costs of merchandise packaging, delivery and carriage.
- The most important of these books, which only start after the initial 30 years, are the books for the *chuànqián rìyòng zhàng* ([串钱日用账] = 'account of daily expenses with strung coins'),[27] and also *rìyòng zhàng* ([日用账] = 'account of daily expenses') together with the books for the 'inwards strung coins account' (*rù chuànqián zhàng* [入串钱账]).[28] These have allowed Yuán & Mǎ (2010) and Ma & Yuan (2012)─and presumably would have allowed TTS─to prepare summary figures for expenses and income for each period (see Level 3 below).

Level 2: Transferred and classified books

The shop's *zhàngfáng* ([账房] = accounting office/staff) transferred the data from the original *liúshuǐ* account books and posted them into classified accounts, e.g. for checking and internal auditing purposes. There are various forms of *zhuǎnlù fēnlèi zhàngbù* ([转录分类账簿] = 'transferred and classified account books'), also known as the 'posted account books', among the TTS books, and they include:

[26] According to Wèi's (1936) newspaper article *(in Chinese*) TTS also had branches that specialized in certain types of these goods but we have not seen evidence of these─cf. section 3 above and Appendix I.
[27] Chinese coins had holes in the centre to allow them to be strung together for convenience http://www.britishmuseum.org/explore/highlights/highlight_objects/cm/s/string_of_800_cash.aspx (accessed 13.09.2014).
[28] See e.g. National Library of China, Beijing: Catalogue No. 49120:118 and a related customer account book Catalogue No. 49118: 40 (from 1834 AD). Also Catalogue No. 49120:122 (from 1839 AD)

(i) Customers / suppliers

The *jiāoyì zǒngzhàng* ([交易总账] = 'general trade account') records, according to the name of a business house or a customer respectively, the time, name, volume, and unit price of the client's purchases (but not normally the monetary value), and the time and monetary amount of payment. Picture 3 shows an example of the account for the same customer as partially recorded in Picture 1 (categorized as Level 1) now being transferred and classified in the customer's account under his name of Jí Xīng Táng (吉星堂).

Insert Picture 3 here

Here the new purchases and payments are recorded on a daily basis. Finally there is a summary of the total and, if payment equals the total price of purchases (as here), the account will be marked with a *wán* ([完] = 'completed') or *qīng* ([清]) = 'cleared'), or simply be surrounded by a circle. If there is any surplus or credit, the positive or negative amount is stated and the account will be marked with a *guò* ([过] = 'transfer'), indicating that this amount needs to be transferred to subsequent account books.

Where the customer had a brought forward debt, the calculation of any closing balance would of course take this into account as well. At later stages customer accounts containing a mixture of commodity and money transactions would be kept by the classical 'four columns (or 'four pillars') settlement system' (*sì zhù jiésuàn fǎ* [四柱结算法]), i.e. opening balance + amounts in – amounts out = closing balance,[29] which is a methodology that assists internal checking and auditing. The example shown in Picture 4 illustrates the working of the full Chinese four columns system.

Insert Picture 4 here

The *wǎngláizhàng* ([往来账] = 'customer individual account') and *cúnjièzhàng* ([存借账] = 'account of deposit and credit') record details on money incoming and outgoing between the shop and other business houses (as in the example in Picture 4).

Other accounts in this category are the *zháihù jiāoyì zǒngzhàng* ([宅户交易总账] = 'resident general trade account') and *zìhào jiāoyì zǒngzhàng* ([字号交易总账] = 'business house general trade account'). These resemble the abovementioned trade accounts, except that they distinguish between private residents and business houses.

[29] For further discussion of its evolution see Hoskin et al. (2016a).

There are general account books, including the account books of the South-eastern villages, of the North-western villages, of the South-western villages (i.e. the general account books of rural areas), of the local area (where the shop is located, called 'the four streets'), of Home Town trade, and of West Town trade. The bookkeeping in these account books is similar to those for the *jiāoyìzhàng* ([交易账] = 'trade accounts') (see the list in Table 2). They are classifications from original account book entries by regions, and for the convenience of checking / internal auditing as well as chasing accounts in arrears.

In addition, there are *qiànqiánzhàng* ([欠钱账] = 'account of arrears'), and *běnjiē qiànzhàng* ([本街欠账] = 'account of arrears of the local streets'), which record customers' accounts that are in arrears.

The *fújìzhàng* [浮记账] or *zhànjìzhàng* ([暂记账] = 'temporary account') are temporary records of the status of debit or credit between the shop and customers, presumably for further reference and checking / auditing.

The *jiāoyì lǎozhàng* ([交易老账] = 'old account of trade') lists customers (firms or residents) that have unsquared balances outstanding and who will be visited for payment and clearing. However as many such 'old' account books of trade appear within the extant volumes (see Table 2), *lǎo* here may not mean that the amounts were seriously in arrears but rather refers to a 'familiar' or 'respectable' book of amounts to be settled (both common usages of the word *lǎo* in modern Chinese).

(ii) Moneylending

The 'running general account of silver' (*liúshuǐyínzǒngzhàng* [流水银总账]) records the shop's silver and copper loans and the monthly interest income. There are around twenty to thirty interest account books, which are precious resources for studies on financial history (Ma & Yuan 2012). These accounts keep information on credit services between TTS and local business houses, pawnshops and common residents, including loan volume, interest rate, date of borrowing, date of payment and amount, and whether there is any mortgage or guarantors.

(iii) Other assets

A *cúnhuòzhàng* ([存货账] = 'stock account') could be used for checking the volume and value of a shop's inventory and could perhaps also be used for checking capital and profit. However very few copies are left among account books that have been preserved in early Chinese archives and, within the TTS account books themselves, only one such account book has been discovered: a Jī

Town [泊镇] stock account, which may in fact have been specially compiled in relation to the sale of that business (although the absence of any related correspondence or other documents leaves this uncertain).[30] Wàn's newspaper feature (1935, p.36/43—*in Chinese*) mentions the purchase of a donkey but this was treated as just another item of expense so no issues of 'depreciation' of an asset arose. Furniture was treated similarly.

With respect to this apparent plethora of account books covering Levels 1 and 2 of the processing of transactions through the accounting system, we may note that early Western DEB systems also spawned a 'variety' of auxiliary books (Goldthwaite, 2015, pp.617-8).

Level 3. Summary financial statements

Summary periodic financial reports could be prepared from the accounts even though these would probably be based on the account books rather than being an integral part of them, unlike the profit and loss accounts and balance sheets that are integral to a Western DEB ledger system (cf. Hoskin et al., 2016a). In our own searches of the archive, we have not found any such summaries among the TTS books themselves but it is clear that they *could* have been readily prepared (albeit not necessarily every month) from the totals of the entries in the *chuànqián rìyòng zhàng* ([串钱日用账] = 'account of daily expenses with strung coins') and *rù chuànqián zhàng* ([入串钱账] = 'inwards strung coins account') as indicated earlier for Levels 1 / 2. Indeed, Ma and Yuan (e.g. 2012) have had these books transcribed and have summarised the figures in them in order to obtain annual totals of cash expenditure and income. But these are only for the main store so even the summarized totals from them cannot be directly reconciled with totals obtained by summing all the extant *liúshuǐzhàng* accounts (including those for the branches, where they survive, the relationship of which to the main store account books is unclear).

In discussing the TTS accounts, Wèi (1936—*in Chinese*) describes monthly 'profit and loss' accounts which he compares to those produced within a DEB system, but this reconstruction seems to be a 'reading back' from much later practice rather than what was actually observable within the archive (see Appendix I).

However, in the TTS archive there also survives an extant series of the *zǒngqīng zhàngbù* ([总清账簿] = 'general account book of clearing'), also called *hóng zhàng* ([红账] = 'red account'), or *yìběnwànlìzhàng* ([一本万利账] = 'account that makes big profits with a small capital'). The information in this book generally refers to the business's record of shareholders' capital shares and deposits. It contains information like the profit or loss reckoned at the year-end financial assessment;

[30] Due to recataloguing in the National Library, it is not currently possible to access this document to see if it is feasible to estimate the basis of inventory valuation.

shares of capital shareholders as well as of the so-called 'expertise shares '; total amount of annual bonus; and the allocation of dividend per share, etc.[31] There are two *yìběnwànlìzhàng* in the existing TTS account books covering a time span of over forty years (1801-1825; and 1825-1843: but with a long gap between 1832-1841). Table 3 presents a sample of a portion of the second of the original Chinese *yìběnwànlìzhàng* with English translation for 1825 (its opening year) and 1826.

Table 3. A Sample of *yìběnwànlìzhàng* ('account that makes big profits with a small capital')

Original Chinese Text	English Translation
道光五年新正月	Dàoguāng 5 (1825), January
入钱 2081300 文，货钱	Investment: 2081300 *wén*, commodity money
入钱 105 千，家俱钱	Investment: 105 thousand (*wén*), furniture money
陆年正月	Dàoguāng 6 (1826), January
得利钱 1533150 文	Profit Income: 1533105 *wén*
入本钱 1385550 文	Capital Investment: 1385550 *wén*
以上共钱伍千吊正 作陆分	Above sums to five thousand *diào*, makes up six *fēn*
人分 叁分	Labour share: three *fēn*
佃底 一分	Rental investment share: one *fēn*
宅子 一分	House share: one *fēn*
共作十一分	Total as eleven *fēn*

Source notes:

1. Capital investment may be money capital provided by shareholders on which interest may also be paid.
2. One *diào* is equal to one thousand *wén* of copper cash. [10 *diào* was probably more than a labourer's earnings for a year: cf. Allen et al. 2011.]
3. *fēn* is "share".
4. The total of investment in goods and furniture (for 1825) and profit and capital investment (for 1826) actually sums to 5105 thousand *wén* (or precisely 5,104,955, presumably rounded). However, the total is given as 5,000 *diào*, so possibly the 105,000 *wén* for furniture has not been included as it was to be considered as part of the real property share categories listed below. This total is converted to six *fēn* or shares.
5. Labour or expertise shares are for managers and employees whose contribution is in the form of their labour / management, known as *shēngǔ* ([身股] = 'expertise shareholders'). While we have no complementary records for TTS itself explaining how the allocation of shares and profits worked, the practice of issuing labour and expertise shares was quite common in traditional Chinese businesses. The most well-studied are the *shēngǔ* [身股], or *dǐngshēngǔ* [顶身股] used by Shānxī [山西] bankers as part of their 'dual class share system'. There the capital shareholders own the shop's assets, and could redeem or pass the shares to their heirs. Managers and employees that are assigned *shēngǔ* do not invest capital but their expertise or labour. One *shēngǔ* is equal to one capital share, and is entitled to the same amount of dividend. However, these shareholders do not have voting rights; their shares are subject to adjustment during shareholders' meetings; and the shares cannot be redeemed or passed to other people (Morck and Yang, 2010, pp. 5-6; Wu, 2016).
6. It is possible that the value of retail shop (or warehouse) space is sub-divided between a leaseholder and original freehold owner in the final two categories of the Table.

Table 3 reveals a profit or dividend sharing scheme allocated according to contributions in the form of investments in the purchase of goods and furniture (for 1825) and of profit income and

[31] It is not known how far there were 'outside' shareholders or others with a right of access to audit the books.

capital investment (for 1826), complemented by contributions from labour (or management) and from leasehold and house value.[32] As can be seen, the total is converted into eleven shares for these two years. Unfortunately, we cannot find the sources of this investment information from other TTS accounts, nor can we reconcile the amounts appearing here with those that have been computed for the same years from the 'strung coins' books discussed above.[33]

However it is clear that the TTS archives do not provide any supporting evidence for the accuracy of the presentation in Aiken & Lu (1998) of how what is there claimed to be the most advanced indigenous Chinese bookkeeping system—the 'Four Feet' system, also known as the *Lóngmén* ([龙门] = 'Dragon Gate')[34] CDEB and ultimately as the 'Heaven and Earth Matching' (*Tiān Dì Hé* [天地合]) and supposedly dating from the mid-18th century—was supposed to operate as an integrated system of account books and financial statements (cf. our Appendix III). It appears more likely that only banks / pawnshops operated bookkeeping systems of that level of sophistication—and then increasingly other large businesses—and probably only from the latter half of the 19th or the beginning of the 20th centuries after there were much stronger Western influences (for further discussion see Hoskin et al., 2016a; cf. Lǐ (2012) Chapter 5 [*in Chinese*]).

Level 4. Miscellaneous Accounts

A *záxiàngzhàng* ([杂项账] = 'account of miscellaneous items') or *fǔzhùzhàng* ([辅助账] = 'ancillary account') was kept in an additional account book by the shop's accounting office to keep a record of miscellaneous or temporary dealings and transactions, so that the account entries required would be clearer.[35]

The classifications above also still leave us with some particular account books, for what could be called *tèzhǒngzhàng* ([特种账] = 'special type accounts'). For instance, the *gōngyí lǎozhàng* ([公仪老账] = 'old accounts for public ceremonies') is an account book that registers some information about TTS and other local firms of Dà Liǔ town in respect of providing public goods (e.g., road and

[32] Unfortunately, as previously noted, for TTS only the account books themselves survive and there are no contracts or related correspondence that could explain more precisely how the system worked there (cf. Auyeung et al. 2005 for the system at the 20th century Zìgòng brine wells which also had external shareholders, but which we shall argue in a further paper also fails to provide evidence of CDEB).

[33] The ratios between the amounts in the *yìběnwànlìzhàng* and those summed from the *chuànqián rìyòng zhàng* and *rù chuànqián zhàng* for individual years can be of the order of ten times. This may be because in computing these summary amounts a consolidation of the figures for the main store and all its branches was carried out which we (like Wèi, 1936) have not seen in the surviving account books. (They might even have included the shareholders' interests in other businesses.) Or possibly in computing the divisible profits allowance was made for inventory etc. investment that is not recorded in the account books surviving in the archive.

[34] The etymology of the name is discussed further in Hoskin et al. 2016a.

[35] There may be parallels with the *Ricordanze* recommended by Pacioli in 1494 for keeping temporary notes of sundry transactions (von Gebsattel, 1994, pp.88-9; 93).

bridge construction, ritual sacrifice and ceremonies) and about the related distribution of financing contributions and the rotation of responsibilities.[36]

In addition, account books have been discovered that record the daily financial receipts and living expenses, and daily consumption, of the apprentices. These might have been kept by the shop's apprentices themselves who also used them as an exercise to practice basic bookkeeping.

Branches

The branch account books (*fēndiàn zhàngbù* [分店账簿]), such as the account books for trading goods in Cháng Wān Branch (see Pictures 1 and 3), and the *liúshuǐ* ([流水] (= 'flowing') daybook account of money transactions in Héng Tài [恒泰] Branch etc., are relatively simple records for TTS branches which probably illustrate how the earlier books of the main store itself would have been kept. It is not known what periodical financial statements may have been prepared for them but we (like Wèi, 1936—*in Chinese*) have not found any evidence of a 'consolidated' account of TTS and its branches (cf. contemporary Japanese merchant houses such as the Nakai family—Ogura, 1982).[37]

5. Chinese and Western Bookkeeping, insights from the TTS accounts

Our detailed examination above of the original TTS accounts allows us to draw out several distinctive features of traditional Chinese bookkeeping by comparison with Western DEB. We consider (a) form, (b) content and (c) functions.

(a) *Form*

Firstly, it is clear that, given that there is no formal identification of 'Debit' and Credit', no page numbering nor internal cross-referencing,[38] it is often difficult to map equivalent categorisations to the stages of bookkeeping found in DEB onto the accounting being undertaken. So the ambiguities found even in the structuring of Western books (as discussed in section 2) are greatly intensified. Here too one account may act across the different levels of 1) recording daily transactions as they occur and 2) organisation of the daily transactions by category, followed by 3) the use of the totals from these for providing classified income and expense summaries or asset balances (the prime

[36] One might compare these obligations to those of the public 'liturgies' (λειτουργία) required of wealthier citizens in classical Athens as a means of financing public services (e.g. Davies, 1971).

[37] As previously noted, this 'missing link' may be a possible explanation for why we have been unable to reconcile the totals from the 'strung coins' books etc. with the related summary *yìběnwànlìzhàng.*

[38] As argued in the Introduction, although Sangster (2016) argues that the ability to locate the corresponding account by such means—which is of course a feature of actual Western DEB accounts—is crucial to there being full DEB rather than just doubled (or 'dual') entries (e.g. where there is trade on credit), we would accept that CDEB was equivalent to DEB even without this feature if it comprised a complete system of interrelated accounts that achieved 'closure' via an income (or 'P&L') account into the owner's 'capital' account (i.e. met the criterion set in Mattessich, 2000, Introduction, p. 13). But we have not found evidence of this kind of system at TTS.

example at TTS being the ‘strung coins’ account that we described in the ‘intermediate books’ subsection of section 3 above, with its subdivisions into accounts for receipts and payments for different types of income and outgo).

Another key feature of the bookkeeping that has emerged from our detailed examination of the original records is that, while credit transactions are recorded, they often remain in physical terms only (e.g. type and quantity) supplemented in the customer’s account by price, but without a monetary amount for the transaction until settled in cash. Only in respect of substantial customers and banking type transactions (which in the West probably constituted the origin of the earliest DEB systems, e.g. Sangster 2016) is there full monetary entry in the personal account of the customer (or supplier), which will provide the ability to strike, in the books, a running balance of the account (see Picture 4). For other goods transactions the TTS bookkeeper would often have to turn to his abacus to calculate value (= price * quantity) for the recorded credit transactions with each customer for comparison with the cash recorded in the customer’s account when received, in order to ascertain whether the account was now cleared or how much was still owing as a balance to be transferred (see Picture 3).

So in comparing Chinese and Western accounting practices here it seems to us important to recognise the continuing influence of the use of the abacus. In the West it took several hundred years for the speed of the abacus to be supplanted by the arithmetic calculations that could be performed ‘on the page’ using Arabic numerals (i.e. ‘algorism’) and this change was an inherent part of the more advanced stages of the development of the self-contained ‘closed’ set of books and financial reports represented by the DEB system (e.g. Macve, 1996; cf. Goldthwaite, 2015; Hoskin et al. 2016b). Importantly, the abacus allows many of the accounting computations to remain *outside* the books themselves, with calculation and recalculation performed as needed. The specialized *Sūzhōu mǎzì* [苏州码字] accounting numerals used in the TTS books have place value of some form, unlike the standard Chinese characters, but their format is more in conformity with the layout of the abacus and assists its use to perform these calculations at very high speed. It does not so much provide the advantage of being able to add, subtract, multiply and divide ‘on the page’ as with Arabic numerals (see Appendix II).

As we see it, one probably needs therefore to reconceptualise the Western idea of a ‘set of accounts’ and to think of a ‘set’ of Chinese accounts as comprising *both* the written books and the ‘off-book’ abacus calculations.[39] So the discipline of the DEB system that ringfences what has been admitted into the books and then visibly processes every transaction through all the stages from prime entry to final profit and loss account and balance sheet, with full-cross-referencing and ‘audit trail’, and with the built-in redundancy of the duplicated information that facilitates internal control

[39] As illustrated in the artist’s impression in Macve (2012).

and checking, is probably unnecessary in an abacus-based system like that of TTS and other Chinese businesses. However to modern Western eyes, accustomed to seeing everything *within* the books, it would inevitably appear, at least on first impression, as a 'deficiency' and that *prima facie* much of the accounting was 'missing'. But given our understanding of the role of the abacus we do *not* see there as having been any deficiency.

As discussed in section 1, strong claims have been made that Chinese bookkeeping had indigenously developed by this period a form of CDEB, the main features of which seem at first sight to parallel the three formal stages of Western DEB ('memorial / journal / ledger'). This 'Four Feet' system, also known as the *Lóngmén* CDEB and ultimately as the 'Heaven and Earth Matching' (*Tiān Dì Hé*) system and supposedly dating from the mid-18th century enabled, it has been claimed, the production of the equivalent of Western DEB's profit and loss accounts and balance sheets (cf. Hoskin et al. 2016a).

However, in the surviving TTS accounts we have not found any evidence in support of this pattern that previous authors have imposed. The most sophisticated examples of TTS's customer/supplier accounts[40] are formally equivalent to ledger accounts in DEB, being based on the 'four-columns (or 'four-pillars') settlement system' (*sì zhù jiésuàn fǎ* [四柱结算法]), with receipts (*shōu* ([收]) written above expenses (*jiǎo* ([缴]) (or alternatively *rù* [入] above *chū* [出]); and with the balance brought forward (*jiùguǎn* ([旧管]), new receipts (*xīnshōu* ([新收]), outlays (*kāichú* [开除]), and the present balance (*shízài* ([实在]) as the four columns (see Picture 4). The silver accounts, like the DEB cash book, probably cover both levels 2) and 3) as well as 1) (e.g. Picture 2).[41] Beyond these there are no accounts recognizably similar to DEB ledger accounts and while the *yìběnwànlìzhàng* provide some summarization of profits (Table 3) there is no evidence of any kind of 'balance sheet'.

(b) *Content*

As already noted, clearly the main difference between the accounting at TTS and fully developed DEB accounting is the emphasis on cash, with the full monetary accounting entries generally not being completed until cash was received or paid. But the information about the quantities and prices in credit transactions was incorporated in the system as they occurred, although it would require abacus calculation to reckon the monetary values involved and correspondingly the monetary amounts owed from common trade debtors. There were also none of the other accruals found in modern DEB accounting: but here it must be remembered that many of these only systematically

[40] In practice, while TTS made sales both for cash and on credit, as many customers would have been well-known, purchases seem generally to have been for cash, perhaps because the supplies would often have been obtained from travelling merchants or by travelling to differing merchants, at different seasons of the year, consistent with the 'travelling' and 'transportation' expenses that are recorded in the purchasing accounts (see section 4).

[41] As noted, for integration with other accounts the silver amounts were converted to their copper cash equivalents.

appeared in Western accounting once modern debates over 'accounting principles' began (e.g. Yamey, 1977; cf. Goldthwaite, 2015).

We compare in Appendix III the entries TTS would have made for a sample of transactions for comparison with those described by Aiken & Lu, 1998 as constituting what are claimed there to have been the traditional 'three-feet' and 'four-feet' (or *Lóngmén* CDEB) accounting systems, where credit transactions are shown as recorded at their monetary value. While the form is clearly different TTS does have equivalent information content, albeit requiring additional abacus calculation 'outside' the books based on the information contained in the books.

In respect of accounting for 'capital' (cf. Nobes, 2015) the summary *yìběnwànlìzhàng* shows the amounts allocated to different classes of stakeholders based on their kinds of contribution to the business (see Table 3). These include, in addition to those who invested money, the *shēngǔ,* the 'expertise' or 'labour' shareholders, whose shares would be assigned by capital shareholders (owners of the shop) to their managers and employees. How far this phenomenon (perhaps combined with the accounts for living expenses discussed in Section 4 above under 'Level 4') can explain the apparent absence of payments for wages in the TTS books requires further research.

(c) *Functions*

How far its books assisted TTS with the three purposes of accounting outlined in section 2 above is still not wholly clear. In respect of purpose a) (having a written 'memory'), the day books and customer/supplier accounts (for trading and for lending activities) report transactions and balances. Given that the accounting basis was primarily cash accounting (but with additional memorandum recording of the details of credit transactions—but generally not their full monetary value) there is no monetary 'doubled-entry'[42] and it is the record of the cash subsequently received in the 'strung-coins' accounts that provides the basis for modern attempts (and possibly theirs) at estimating the trading results for a period. Moreover there is no surviving evidence of any 'continuous inventory' accounts for the goods and only one 'stock-taking' sheet survives.[43] This primary focus on keeping track of the cash was perhaps particularly important in the Chinese business context where there were many clerks, family members and other people with the opportunity to divert cash to their own use.[44] Given that the TTS monetary accounting system focussed almost exclusively on cash 'in' and 'out', a comparison of 'opening cash' and 'closing cash' as the alternative, equivalent measure of

[42] Until the level of sophistication shown in Picture 4 was reached later on.

[43] Wàn (1935, *in Chinese*) identifies an account for land purchase (which may be part of the volumes now missing) and he also mentions the one stock-taking book that survives which suggests no continuous inventory records for goods were kept. As previously noted, he also (1935, p.36/43) mentions the purchase of a donkey but this was treated as just another item of expense so no issues of 'depreciation' of an asset arose. Furniture was treated similarly. More generally, no 'accruals' have been identified in respect of other transactions not yet settled in cash. However, Dr Yuan Weipeng has seen inventory records in the accounts of other similar businesses which are still to be analysed and reported.

[44] Perhaps surprisingly Auyeung et al. (2005) explain the absence of cash records at the 20th century *Zìgòng* brine wells as reflecting trust among the participants. As previously noted, surviving early Italian examples of DEB do not always include a cash book (de Roover, 1956) or clearly kept it outside the general ledger (Goldthwaite, 2015, p.627).

profit would have been more effectively an exercise directed primarily to cross-checking the accuracy of the recording.

Clearly the keeping of the customer and supplier accounts for purpose a) also assisted the 'settling' of debts and presumably the resolution of disputes, and it appears that the accounts relating to the 'banking' activities and for substantial trading partners were kept in better form (with opening and closing balances and consistent division of entries on the page into (upper) receipts and (lower) payments in the traditional 'four-column balancing' (*sì zhù jiésuàn fǎ* [四柱结算法]) form, as shown in Picture 4 (cf. Hoskin et al. 2016a)).

The practice of converting both silver and copper transactions into copper as the 'accounting currency' (e.g. used in the 'strung coins book' and in the silver account book) suggests a concern with knowing the overall picture of activity both for distribution among the owners' shares (i.e. purpose b))[45] and possibly also for reflecting on the success or failure of the business's various activities in various locations—purpose c).

More important would be assessing whether it was appropriate to distribute the fruits of successful years or to recognise a need to conserve resources when times were bad or to invest further if expansion promised good returns. But there is no evidence in the surviving books[46] of either consolidation of the results of the TTS businesses as a whole, or of analysis of profitability by lines of business and types of merchandise for management decision making purposes.[47] And although it is possible to use the daily figures from the 'strung coins' books to construct monthly and annual results (Ma & Yuan, 2012) it has so far proved impossible to reconcile these with 'round sum' totals summed from all extant accounts (possibly due to missing information about the relationship between the branches and the main store). Nor could the constituents of the *yìběnwànlìzhàng*, that provided the basis for distribution in many (but not all) years, be traced.[48] So the TTS accounts do not currrently allow us to see how the summary financial results were prepared as a basis for distribution among 'shareholders' or how far the owners understood that profit could

[45] During this period covered by the TTS accounts in Qīng China, the bulk of imperial taxation was land tax. Commercial taxation such as taxes on trade, transit, licences etc. occupied a small share of the total taxes (Brandt et al. 2014). It is likely a grocery store like TTS could be liable for a fixed amount of license taxation or other possible forms of informal taxation by the local authorities. We do not expect these taxes would lead to official inspection of TTS's account books (as they might with respect to the books of the Zìgòng brine wells during the early 20th century, cf. Auyeung et al. 2005) or that there might be surviving tax collectors' records relating to TTS.

[46] There might be in the currently missing 38 books from the total of 475 originally deposited by the Rong family (see section 3 above).

[47] However, Yamey (2000) argues that in a business of any complexity estimation of profitability across different component activities must inevitably involve arbitrary allocations and will generally be of doubtful benefit for future-oriented decision making.

[48] Although they might additionally keep full running customer/supplier accounts (including transactions on credit) many Western businesses would also traditionally avoid the need for full continuous DEB by taking periodic stock of their other assets and liabilities 'outside the books' and thereby converting the periodic totals of the recorded cash receipts and payments into 'income and expenditure' and a calculation of profit and capital (which could then be entered into the books as period-end adjustments) (e.g. Macve, 1996).

be computed either by comparing opening and closing net assets (allowing for any new capital injections or distributions) or by computing the net result of sales less expenses (including credit transactions and the cost of goods sold)—cf. Ogura, 1982. However, these unavoidable limitations to our own research clearly do not imply that the TTS accounting system itself had shortcomings that inhibited the running of a successful business of considerable complexity over a very long period.

6. Concluding comments

The accounting archive of TTS that has only recently been re-discovered (and explored here for the first time in English) is the largest and most integrated early Chinese archive examined so far. It yields important data about economic activity but our focus here has been on the accounting practices it reveals. Its surviving books span a period from the late 18th century to the middle of the 19th century. They may therefore be regarded as representing primarily 'indigenous' Chinese bookkeeping practices. We have set out the various kinds of accounts that were kept and what can be reconstructed of the interrelationships between daily running records and the various 'ledger' accounts for customers and suppliers (including loans at interest) and of the process by which financial statements were produced. Given the claims that have repeatedly been made for the importance of DEB for capitalism's development in the West, our findings from examining this extensive collection of original account books are important for comparing the nature of Chinese bookkeeping and accounting and its role in China's economic development.

Despite the difficulties of fully penetrating the precise accounting systems being employed by TTS as its business grew, the archive of its surviving books—unparalleled in its extent—that we have described and illustrated here show that Chinese accounting was able to adapt to the increasing scale and complexity of its merchanting and related financial business during the late 18th and early 19th centuries without there being obvious problems resulting from the lack of DEB (as least as far as can be told from the available TTS books).[49]

Indeed, our detailed study of TTS confirms many of the issues raised in the well-known debates among a new generation of professional accountants in China in the 1930s on the relative merits of reforming traditional Chinese bookkeeping and accounting vis a vis importing DEB from the West. Many of the issues of interpretation we have considered above with respect to TTS and have examined in light of the claims made for 'CDEB' are precisely the same issues that the modernising Chinese accountants at the time addressed in advocating the adequacy of simply improving traditional Chinese bookkeeping so as to avoid the necessity for importing 'full' DEB (e.g. Gardella,

[49] How far DEB was necessary for successful Western mercantile capitalism, and subsequently for industrialization and the development of cost accounting, also remains contested (see e.g. Hoskin & Macve, 2000; Hoskin et al., 2016b).

1992). As argued in Hoskin et al (2016a, b), in the course of this debate the reformers' desire to stress the inherent fundamental merits of the Chinese approach may have coloured their view, and thereby that of subsequent scholars, of just how far traditional, indigenous Chinese accounting practice had already developed similarities with DEB before the arrival of Western influences—i.e. could properly be called CDEB. But we have found no evidence in the surviving account books of TTS of such CDEB.

While some speculation about the missing contents of the complete archive is inevitable, this does not alter our basic contention that the surviving TTS books do not show any evidence of a fully integrated bookkeeping system at all three levels that has been claimed for the purported CDEB presented by earlier authors (but without any primary evidence). Nevertheless they contained the information needed to be able to monitor customer's debts and to summarise daily transactions into periodic results as needed for TTS's business purposes.

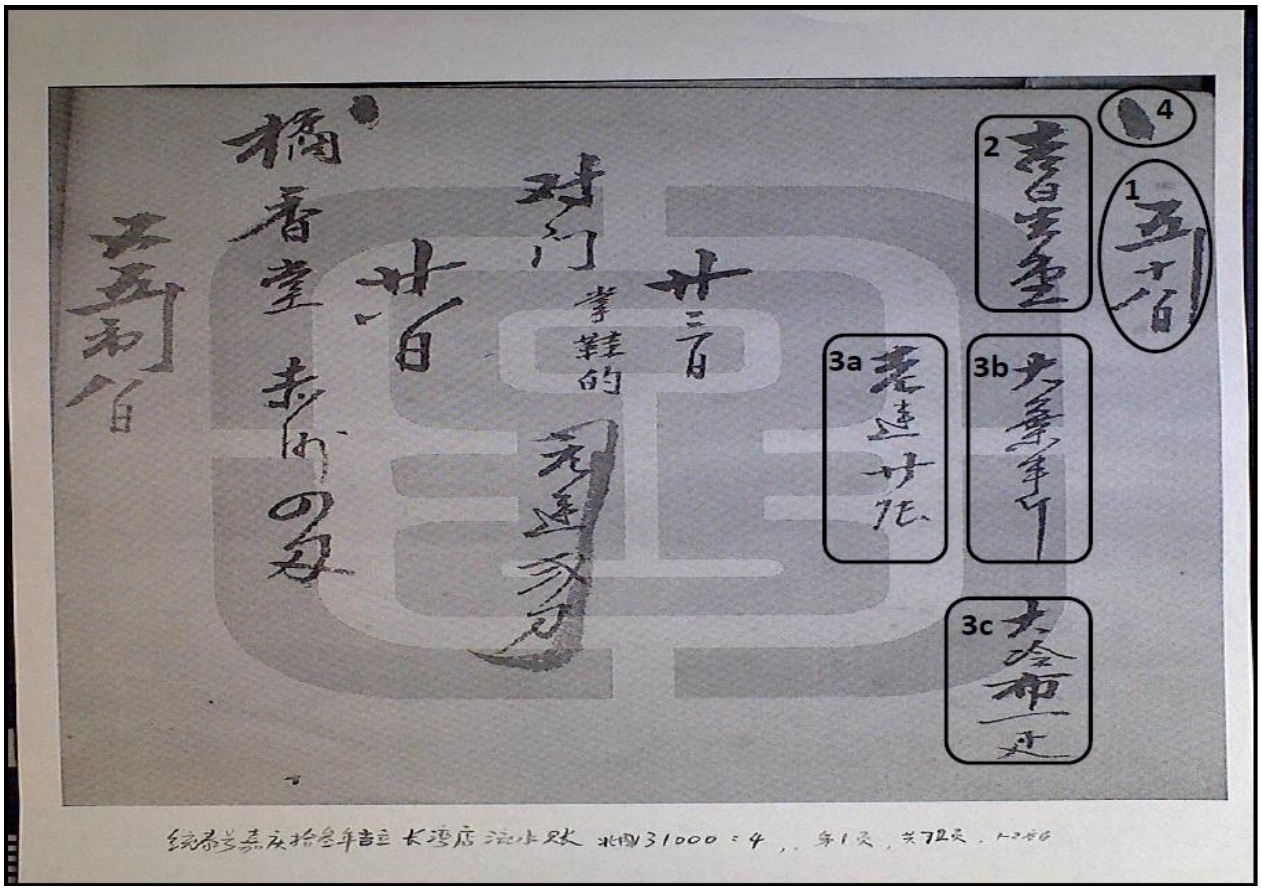
By focusing much more comprehensively on various aspects of a set of accounts as full as is that of TTS, including the writing system and the account book structure of the original records in the historical archive, we also gain unusual insights into cultural and social aspects of pre-modern Chinese society. As shown in Pictures 1 through 4 (and their detailed accompanying explanatory notes), the meticulous attention to details, to cross-checks, and to the systematic development of notations and accuracy in counting throughout the account books is indeed impressive. It is important to be reminded that the TTS accounts were kept and maintained by a substantial but still 'medium-sized' grocery / merchant-banking business in a rural market town as average as many others in Northern China. This is itself a powerful testimony to the market rationality of traditional Chinese merchants and possibly to the relatively high degree of Chinese numeracy and literacy achieved in the early modern world.[50]

The TTS books offer a fascinating insight into Chinese business and accounting in the pre-industrial era. It is to be hoped that our detailed reporting in English of this unique archive will stimulate both further efforts in China to discover and preserve yet more archives, and further collaboration between Chinese and overseas scholars to publish the findings for the benefit of English speaking accounting and economic historians.[51] It is from such micro-foundations of how its institutions operated that a clearer picture can be built of the vitality of Chinese economic activity, of the role of its accounting practices, and the implications for debates over the causes of the 'Great Divergence' as well as over the significance of DEB in the history of the West (e.g. Brandt et al., 2014; Hoskin et al., 2016a).

[50] See e.g. Baten et al., 2010 for numeracy and literacy in 18-20th century China.

[51] As previously noted, it would be valuable if future research in other archives as they are discovered could reveal contracts, business correspondence, minutes of meetings etc. that can be linked to business accounts to shed more light on issues such as profit sharing, accounting for labour, and implications of taxation (cf. Auyeung et al., 2005; Zelin, 2009).

Picture 1. Day Books of Cháng Wān [长湾] branch from Jiāqìng 13 (i.e. starting in 1808)



Notes:

1: Indicates May 18th (lunar calendar). Note that the Chinese character for month [月] is simplified as a vertical line.

2: The name of the client: 吉星堂 (Jí Xīng Táng).

3a,3b,3c: all indicate the names and quantities (but not the prices) of the items purchased by this client. Respectively, they are: 20 sheets of paper (老连二十张); a half *jīn* of tobacco leaves (大叶半斤);[52] one bolt of Daleng cloth (大冷布一匹) [all written in traditional Chinese characters not these simplified characters (where different) that were only introduced in the mid-20th century]. All these three items are transferred into the customer account shown in Picture 3.

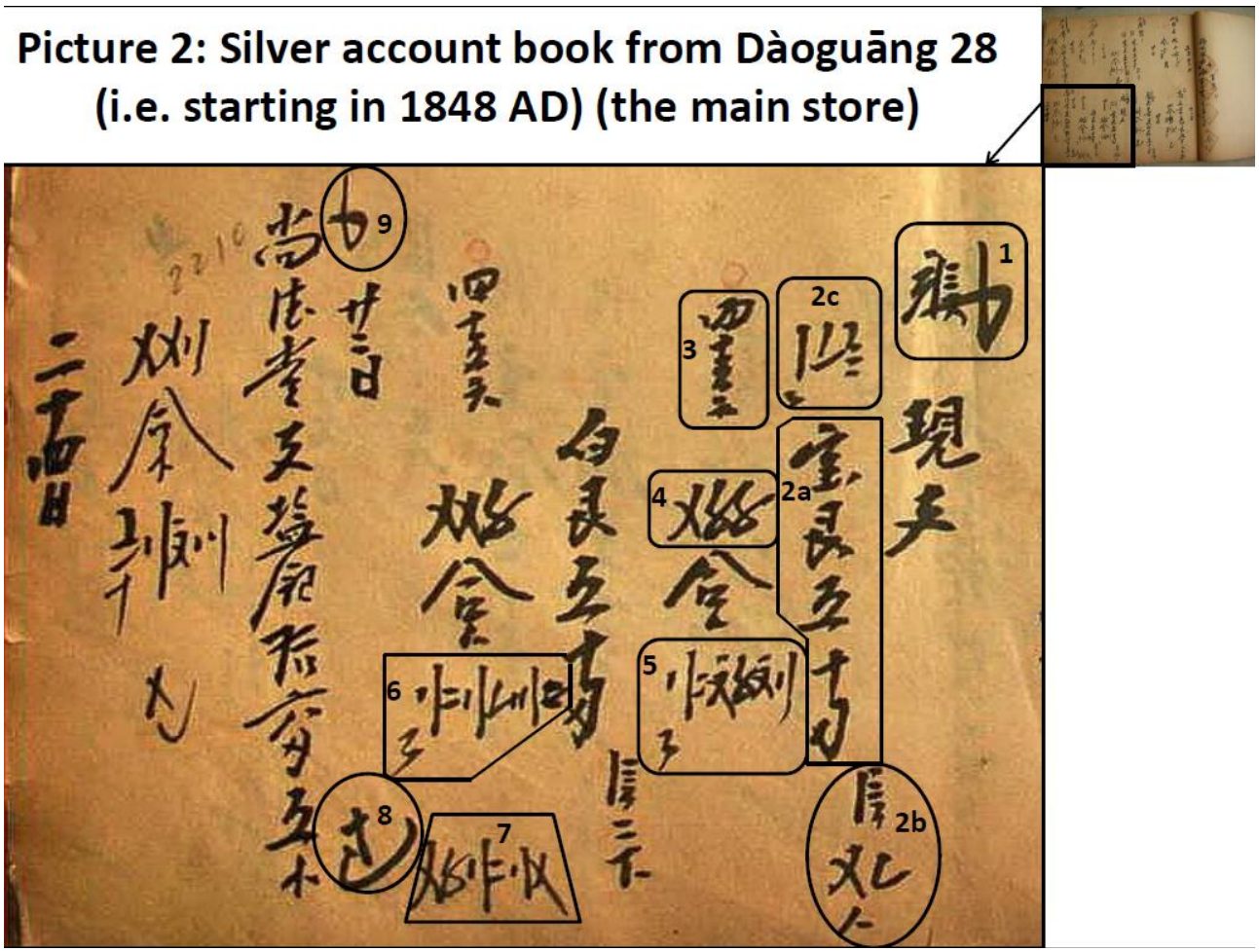
4: A notation for transferring an account, indicating the transaction is not cleared (i.e. is on credit) and has been/needs to be transferred into the customer's account (as shown in Picture 3).

The rest of the information in the account (reading from right to left) is transactions with other customers on other days.

[*Catalogue: National Library of China, Beijing: 131000:4 whose watermark appears on the copies (as in Picture 3). The writing at the bottom of these pictures relates to cataloguing in the Library.]*

[52] *jīn* [斤]: a measure of weight, about 500 grams as the current standard but it could vary by region in traditional China.

Picture 2: Silver account book from Dàoguāng 28 (i.e. starting in 1848 AD) (the main store)



Notes: This illustration is cut from part of the bottom half of a whole page of an account book (see top right corner for the full page where the separation of the upper half (for receipts) and the lower half (for payments) is clear). The rest of the information in the account (reading from right to left) is transactions with other customers on other days.
[The pencil marks in Arabic numerals are the modern annotations of someone working on the archive in the CASS Institute of Economics Library.]

1. The name of a client: Zhāng (张);

2a. Pay out of Bao Silver (*bǎoyín* [宝银])[53] fifty *liǎng* (i.e. taels).[54]

2b. 'Long four qian six li' (长四钱六厘) with the numbers written in the *Sūzhōu mǎzì* system of numerals (see Appendix II). This means this actual *sycee* of Bao Silver exceeds the standard 50 *liǎng* by 0.46 *liǎng*. So the total value of this Bao Silver is 50.46 *liǎng*.

2c. It seems most of these Bao Silver *sycees* are given a serial number for internal check. The number of this piece of Bao Silver is 168, also written in *Sūzhōu mǎzì*.

3. Forty five days (四十五天): this means this exchange represents a loan of 45 days. Note the copper/silver exchange rate 4550 *wén*/*liǎng* (as shown later) is higher than the 4420 *wén*/*liǎng* in another separate transaction. Comparing these two exchange rates, one can calculate implicit interest rates as has been done by Yuán & Mǎ (2010) (*in Chinese*) and Ma & Yuan (2012).

4. The copper/silver exchange rate 4550 *wén*/tael. Note that the zero is dropped in the final position, a practice quite common throughout these account books.

5.Total copper cash value of this transaction: 50.46 x 4550=229593. Note the account book in *Sūzhōu mǎzì* only shows 229592 *wén*, one *wén* short. The same is true with the last transaction shown: the exact total should be 50.04*4420 = 221176.8 *wén*, but it is recorded as 221176 *wén*. (These minute differences both presumably result from the method of rounding adopted.)

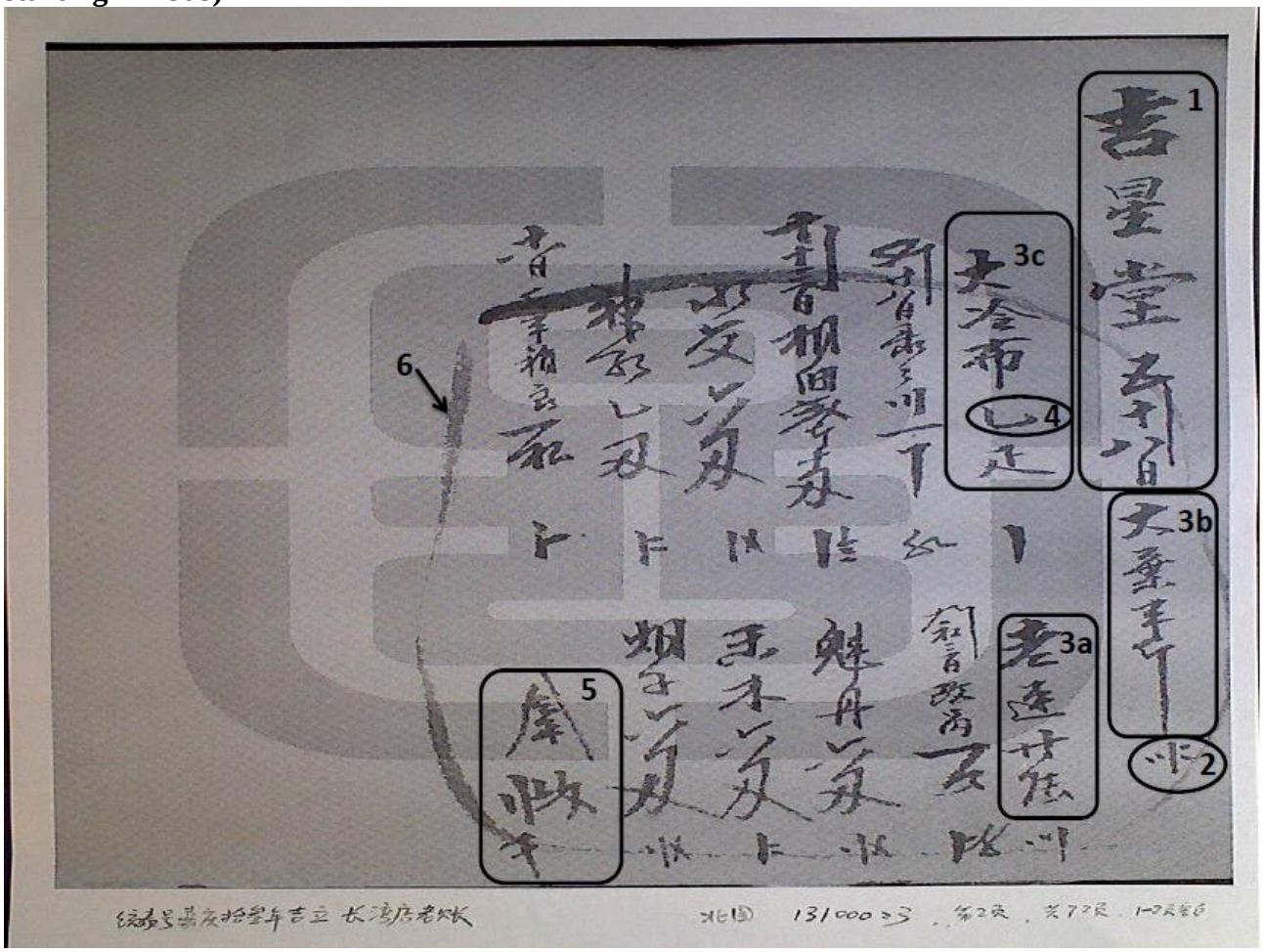
6.This is the second transaction with Zhāng (张) which sums to 222632 *wén*.

7. The sum of these two transactions with Zhāng which adds to 452224 (=229592+222632).

8.The Chinese character 过 (*guò*) means the account is not yet cleared and has been / needs to be transferred to the customer's account awaiting settlement, as does the small triangle or circle marked '9'.

[53] This is silver minted into the traditional boat-shaped ingots called *sycees* (see artist's impression in Macve, 2012).
[54] The weight of the tael varied but was usually about 37 grams, see Allen et al 2011.

Picture 3. Customer's Account in books of Cháng Wān [长湾] branch from Jiāqìng 13 (i.e. starting in 1808)



Notes:

1: The name of the client (the same as in Picture 1): Jí Xīng Táng (吉星堂) also dated May 18th (in the lunar calendar).

2. The unit price of tobacco leaves: 32 *wén* (written in *Sūzhōu mǎzi*). Note that the unit prices are written for every commodity in this account (but are not in the day book [*liúshuǐzhàng*] in Picture 1).

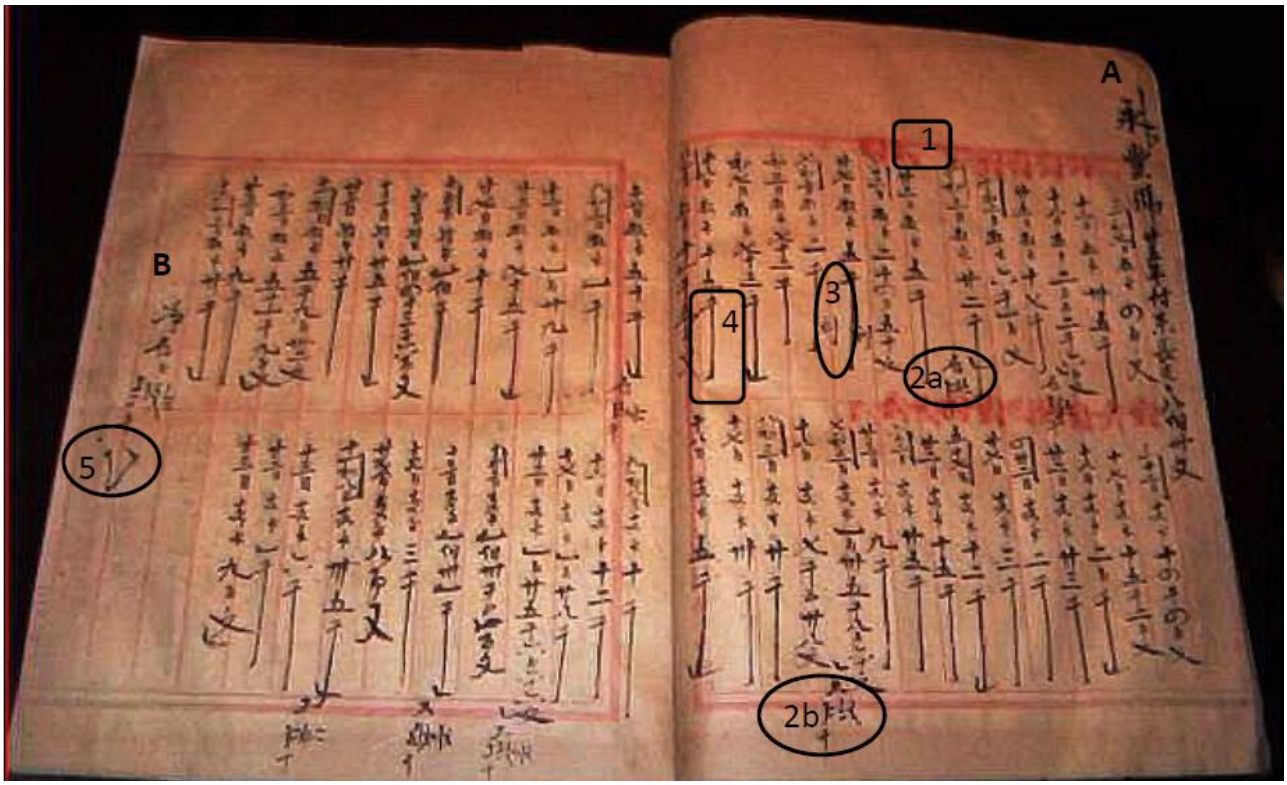
3a, 3b and 3c: These are the same three commodities transferred from the *liúshuǐzhàng* in Picture 1, but with the additional information of their unit prices.

4. For the item 'one bolt of Daleng cloth', the Chinese character for 'one', 一, is here distorted to avoid fraudulent alteration.

5. The sum is copper cash 2790 *wén*, which is the total value of the twelve commodities transacted.

6. This large circle indicates that customer account is now cleared.

Picture 4: Customer account from Dàoguāng 26 (i.e. starting in 1846 AD) (the main store)



The account page (photographed from the original held in the National Library, Beijing) gives a good illustration of the 'Four Columns' (or 'Four Pillars') system (*sì zhù jiésuàn fǎ* [四柱结算法]).

Notes:
The First 'Column / Pillar' (marked as 'A' on the picture): The customer's name is Yǒngfēng Hào (永丰号). The line '二十五年付来长支钱八百三十文' means: 'has not paid 830 *wén* previously owed from year 25'. This is what is traditionally referred to as the first column *jiùguǎn* [旧管] which refers to the credit/debit balance brought forward from the previous account, 户欠钱 830 文 (*hù qiàn qián 830 wén*).The character 长支(*cháng zhī*: literally 'spend more') is a polite way of saying owing money.

The Second 'Column / Pillar': the entire upper half of the account page records all the money received. It is known as *xīnshōu* [新收].

The Third 'Column / Pillar': the entire lower half of the page records all the payments made out. It is known as *kāichú* [开除].

The Fourth 'Column / Pillar' (marked as 'B' on the picture): the ending balance is known as *shízài* [实在]. Here it shows a surplus of 3698 *wén* for this customer's account for this year.

Other interesting notations in this page:
1. The red ink character "對"(which is the traditional form of the character 对) indicates the account has been checked internally. These red ink characters are not so clear to read as they are made by stamping 'chops' using red seal paste ([朱砂] *zhūshā*). They also appear in the bottom half.
2a.The subtotal of the columns of copper cash value received recorded in the columns immediately to the right (as the account is read from right to left). Note these subtotals are done regularly throughout this page.
2b. The subtotal of the columns paid (with corresponding procedures to 2a).
3. The character Liú (刘) is the signature of the recorder or accountant.
4. This is the character of one thousand (千= *qiān*). Note the vertical stroke of this character is always extended all the way down to fill the column and thereby avoid fraud.
5. The Chinese character *zhī* [之]. It means the same as 过 [*guò*] and indicates that the account is not cleared and has been/needs to be transferred as the opening balance (*jiùguǎn* [旧管]) in a new account.

APPENDICES

APPENDIX I Wèi Zéyíng's reconstruction of a summary financial statement from the TTS archive

Wèi (1936) in his newspaper article claims that monthly summaries of results were prepared in the following form which he compares with those produced within the DEB system. He sets his comment out as (*our translation from the Chinese*):

> Total income and expenditure in the daily general journal were closed every five days and there was a monthly summary whose form[55]is set out below.
>
> Total Month
>
Sales of livestock income	xxx	Purchasing of livestock	xxx
Interest income	xxx	Petty use expenditure	xxx
Commodity sales income[56]	xxx	Interest expenditure	xxx
		Weight loss	xxx
		Daily usage	xxx
		Travelling expenditure	xxx
		Purchasing commodities	xxx
Total income	xxx	Total expenditure	xxx

> From this we can know how much we earn every day. But we should notice that 'purchases money' was not money expended buying inventory but rather income by sales of goods.[57] Tongtai's business was stable so that its income and expenditure had little difference monthly. Probably its purchases of goods lived within its means. We can see from the above that in the monthly summary (*yuézǒng* [月总]), almost all incomes and outgoes of goods transactions were aggregated together. This account was very much like the profit and loss statement of double-entry accounting. Unfortunately, the trading account for villages was not included so that it can be only regarded as profit and loss of the (main) shop business. However, why did the 'villages owed goods account' not go through the general journal? Because credit sales did not receive cash, it would be not reasonable recording them as 'purchases money'. And the concept of cash was very important to single-entry bookkeeping so that such non-cash expenditures were not really appropriate to be included which is the disadvantage of single-entry bookkeeping.

In our view it is likely that Wèi was influenced to see the supposed parallels with DEB by the debate then taking place in China between those like himself who wanted to keep the traditional bookkeeping and therefore were anxious to show how easily it could be modestly reformed to be even more like DEB (but recognizable as CDEB) and those on the other side (like Shu Lun Pan) who argued it needed to be jettisoned

[55] While this could be the content of any summary it cannot be the form, which would be in normal Chinese layout with 'in' (*rù* [入]) above and 'out' (*chū* [出]) below, and entries written vertically from right to left.
[56] What Wèi calls 'purchases money'.
[57] i.e. explaining that *rù huò qián* (literally 'in goods money') means '*rù huòqián'* not '*rùhuò qián'*. Hence our preferred translation is 'commodity sales income'.

in favour of a wholesale import of the 'modern' Western DEB system (for further discussion see Hoskin et al. 2016a,b).[58]

APPENDIX II The *Sūzhōu mǎzì* [苏州码字] characters used in the 18th and 19th century TTS merchant account books

Along with the standard Chinese numeral system, TTS also extensively employed the so-called *Sūzhōu mǎzì* [苏州码字] numeral system, a positional numeral system widely popular in bookkeeping and accounting for its convenience and conciseness. The *Sūzhōu mǎzì* numeral system is a surviving variation of the rod numeral system adopted in the indigeneous tradition of Chinese mathematics. The rod numeral system also forms the functional basis of the Chinese abacus (Martzloff, 2006, chapters 12 and 13; http://www.britannica.com/EBchecked/media/85039/Counting-boards-and-markers-or-counting-rods-were-used-in (accessed 13.6.2014)). The *Sūzhōu mǎzì* are also called *guǎngshì shùmǎ* [广式数码] i.e. Cantonese numerals.

In this system, the Chinese numbers one through nine, i.e., 一, 二, 三, 四, 五, 六, 七, 八, 九 are alternatively written as 〡, 〢, 〣, 〤, 〥, 〦, 〧, 〨, 〩 respectively.[59] This has to be modified, as writing was done horizontally from left to right, so that whenever the numbers one, two or three are adjacent to each other there will normally be use of modified Chinese characters and the specialist Sūzhōu numerals in order to prevent confusion. For example, 123 could be written as 〡二〣 or 一〢三; 312 could be 〣一〢 or 三〡二.

Because of these features, the *Sūzhōu mǎzì* system was particularly useful in Chinese bookkeeping which also relied heavily on the abacus. It may have originated in Sòng China (960-1279) and became diffused (along with the use of abacus) through the Míng and Qīng periods (1368-1911). Sūzhōu, China's most important centre of trade and commerce in the Lower Yángzǐ, may have been the origin of this numeral system. While the *Sūzhōu mǎzì* system had almost completely disappeared in contemporary mainland China following the massive introduction of the Arabic numeral system from the late 19th century, it still occasionally continued to be used in Hong Kong and Macau. (For sources *in Chinese* on the history of *Sūzhōu mǎzì* see Bì Zhìfū (2010); Guō Dàoyáng (2004) pp.48-57; Lǐ, Bózhòng (2004); Lǐ, Jǐngzhāng (2012) pp. 83-5. See also Tadashi (1907), chapter 2 on Qing Accounting Practice (*in Japanese*).)

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[58] It is perhaps feasible that up to around 50 years of such summary monthly accounts could account for the 38 books missing from the archive but there is no direct evidence or other clues linking the 437 books that we have to such possible summaries. Other suggestions have been that the missing books relate to land transactions (for various possible reasons).

[59] They are probably easier to write quickly with a brush pen (*máobǐ* [毛笔]) using vertical strokes instead of the normal horizontal strokes used for the standard numeral characters.

APPENDIX III Comparison of how TTS recorded transactions as compared with the purported CDEB system described in Aiken & Lu (1998)

By illustrating how TTS recorded business transactions this Appendix shows that TTS, presumably relying on the abacus for speedy calculation of the monetary amounts of credit transactions and of customers' outstanding balances as required, and also for preparing periodic summary accounts, did not need either the careful continuous pen-and-ink columnar balancing of the Arabic numerals to be found in the columns of a Western DEB ledger account; nor the supposed system of recording through the sequence of books described by Aiken and Lu (1998) in the *Lóngmén* system they are describing but for which they give no original archival illustrations.

Suppose there are four examples of transactions in TTS shops as below:

1) purchase of goods on credit
   May 1, Purchase of goods (silk, 20 *jīn*[60]) from X firm on credit
   (for ten days) 10000 *wén*
2) cash sale of goods
   May 1, Customer Y buys silk for cash 6000 *wén*
3) pay cash for expenses
   May 1, pay individual C for travelling expenses to purchase silk from somewhere for the shop 1000 *wén*
4) sale of goods on credit
   May 2, Customer D buys cotton (15 *jīn*) on credit
   (for 20 days) 9000 *wén*

These transactions are numbered to correspond with the equivalent kinds of transactions in the exposition of the '*Lóngmén* bookkeeping system' given by Aiken & Lu (1998 pp.230-233) ('A&L')[61] but in addition we show the resulting cash settlements.

STEP 1

First the transaction would be recorded in TTS in the *liúshuǐzhàng* daily books (see section 4 'Level 1'), equivalent either to A&L's *cǎoliú* or *xìliú*, as below: note that the money amount is only recorded here where cash is actually paid or received. Payments /receipts in silver are then converted to copper for further accounting purposes. While in the early days of TTS transactions in both currencies could be combined in a *chūrùliúshuǐzhàng* ([出入流水账] = 'daily account of money payments and receipts') or in a *chūrùyínqiánliúshuǐzhàng* ([出入银钱流水账] = 'daily account of silver and copper payments and receipts'), later the transactions in different currencies were generally separated in different account books, such as the *chūrùyínliúshuǐzhàng* (出入银流水账) for silver and the *chūrùqiánliúshuǐzhàng*（出入钱流水账）for copper. Most of the purchasing by the shop was in silver while the general sales were in copper coins. For some customers who used both silver and copper coins in business, both currencies were recorded and the ratio between the silver and copper coins was given for each silver payment (see Picture 2). In later stages also, daily purchases and sales could be recorded in specialist day books in accounts such as *mǎihuò zǒngzhàng* ([买货总账] = 'general account for purchased goods') and *mài (mián) huā zhàng* ([卖（棉）花账] = 'account on sales of cotton') (see discussion in section 4 of 'intermediate books').

[60] *jīn* [斤]: a measure of weight, nowadays = 500 grams

[61] For a critique of the purported historical development that they portray see Hoskin et al., 2016a,b.

May 1,
In the upper section of the page:
shōu [收] X firm, silk 20 *jīn* Transferred (*guò* [过])
shōu [收] Y silk, money 6000 *wén* [62]

In the lower section:
chū [出][63] paid C for travelling expenses (*pānfēi* [盘费]) 1000 *wén*

May 2
In the lower section:
D, cotton, 15 *jīn*

May 11
chū [出] X firm, silk money 10000 *wén* Clear (*qīng* [清])

May 22
shōu [收] D, cotton money 9000 *wén* Clear (*qīng* [清])

The pages are not always split 'top and bottom' (as is shown in our Pictures 1 and 3 from Chángwān branch but also found later in examples from the main store). In Chinese characters, all entries are made vertically, and to be read from right to left across the page.

STEP 2
Then in the classified accounts (the suppliers' / customers' accounts), we can see in the supplier's account:[64]
X firm
May 1, silk, 20 *jīn*, 500 *wén*
May 11, *chū* [出] money 10000 *wén*
Clear (*qīng* [清])

NB because the money value of the credit purchase is not recorded (only the quantity and the price), the bookkeeper has to calculate on his abacus whether or not the payments made have yet cleared the account or whether there is a balance still owing to transfer (the same applies *mutatis mutandis* for the customer D's account below) (see Picture 3).

The travelling expenses may have originally been recorded in a daily *măihuò zŏngzhàng* ([买货总账][65] = 'general account for purchased goods'), which also serves (at Levels 2 / 3) to provide the periodic total for purchases and related expenses.[66]

In the customer's account, we can see:
D
May 2, cotton 15 *jīn*, 600 *wén*
May 22, *shōu* [收] money 9000 *wén*
Clear (*qīng* [清]).

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[62] If in the early stage of TTS's main store or in a branch shop, this transaction may not be recorded or recorded simply as: *rù* [入] / *shōu* [收] money 6000 *wén*.
[63] Or *fù* [付] or *zhī* [支].
[64] In fact at TTS almost all purchases of goods appear to have been for cash and generally in silver (converted to copper for accounting purposes). The frequency of related 'travelling expenses' is perhaps circumstantial evidence that suppliers were not local and so could be reluctant to advance credit.
[65] TTS uses the more modern character for account [账] which incorporates the sign for '贝', the ancient cowrie shell money. In discussion with Professor Guo Daoyang he has explained that in earlier times the character was 帐 which incorporates the sign for 'tent', believed to represent the tents of the Emperors' travelling tax collectors. A&L (1998) use this character presumably to reinforce the 'antiquity' of their example although the kind of mill in their example is actually an industrial mill of the type that only appeared in the late 19th / early 20th century.
[66] See discussion in main text in section 4 under 'intermediate books'.

STEP 3
Finally, in the periodic summary accounts (which in A&L's description are the purported final bookkeeping product of the numbers in the *zǒngqīng* accounts), these transactions would be reported as:

rù [入] Sales money :
May 1, 6000 *wén*
May 22, 9000 *wén*
Total: 15000 *wén*

chū [出] Purchases money:
May 11, 10000 *wén*
chū [出] Travelling expenses
May 1, 1000 *wén*

These totals could be accumulated from the classified daily accounts 'of strung coins' (*rìyòng chuànqián zhàng* [日用串钱账]). However we have not so far been able to reconcile those totals with the summaries that were prepared for profit distribution (the *zǒngqīng zhàngbù* ([总清账簿] = 'general account book of clearing'), also called the *hóng zhàng* ([红账] = 'red account'), or *yìběnwànlìzhàng* ([一本万利账] = 'account that makes big profits with a small capital')—see section 4 'Level 3'.

Note also that in A&L's example (1998: 151) (followed by Ji & Lu, 2013) they claim that there was a *particular* Chinese form of 'doubled-entry' for non-cash transactions whereby the latter were apparently treated 'as if' the transaction had first involved a receipt/payment of cash for the item and then a settlement in cash. In describing the 'Three Feet' system A&L (1998: 150) had also given the example of settling an account payable for firm B in silk, i.e. the kind of 'barter' transaction common in other early economies (e.g. Baxter 1945), which they say would require 'Receipt: silver from silk' followed by 'Disbursement: silver to B firm', i.e. again treated 'as if' there was money actually involved.[67]

We would argue for an alternative interpretation, as presumably a purchase on credit of silk from B firm would be recorded by the reverse of these two entries, which would therefore appear indistinguishable from the example of a credit purchase of calico from a cotton mill given as transaction #1 in the example of the full *Lóngmén* CDEB system that they describe next.[68] It seems to us that the 'notional cash' transaction in the 'Three Feet' system they describe, if this is indeed what happened, also represents no more than the fact that a credit sale transaction is being recorded *in money units*, i.e. taels of silver 银两 (pīnyīn: *yínliǎng*) for both the inventory item and the (previous) creditor. Although TTS did not record the money amount of credit transactions until they were settled (presumably requiring reference to abacus calculations to establish the current financial position), nor apparently keep continuous inventory records, there is a clear distinction made in TTS between the 'credit' element (for the goods purchased / supplied) and the cash settlements; and

[67] The 'three-feet' or 'lame' system is so-called because there was apparently no doubled entry of the money amounts for cash payments and receipts, only for the value of credit transactions (see the detailed discussion in Hoskin, et al., 2016a). TTS therefore seems to have had its individual variant: there is doubled-entry for cash payments and receipts in the suppliers'/customers' 'ledger' accounts but not for the value of credit transactions (cf. the discussion of DEB in section 2).

[68] As noted, the kind of mill in their example is an industrial mill of the type that only appeared in the late 19th / early 20th century. If there is an actual historical accounting record underlying their example it must therefore be from a period considerably later than the middle of the 17th century to which they ascribe the invention of the *Lóngmén* system they are describing (see Hoskin et al., 2016a,b for further discussion). Also suggestive of the later date is that their *numéraire* is silver unlike TTS's use of copper.

use of ‘money of account’ is clear in TTS as silver transactions are normally converted to the equivalent copper value for accounting purposes. In these respects the TTS system seems superior to the apparently more complex systems described by A&L (albeit without reference to any first-hand original sources for their examples).

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