

INCENSE AND INDUSTRY: LABOUR AND CAPITAL IN THE TEA DISTRICTS OF HUIZHOU, CHINA*

I

INTRODUCTION

Rural tea production in late Qing China (1644–1911) was far more dynamic than previously imagined, both by observers at the time and by subsequent historical scholarship. In the tea districts of Huizhou in the south of the province of Anhui, specifically, tea producers, despite exhibiting few signs of technological breakthrough, became enmeshed in the social dynamics of endless capital accumulation, distinguished by an obsessive fixation on productivity.¹ In order to survive in a world market increasingly crowded by domestic and overseas competition, inland tea merchants assumed greater control over production, contracting out work to factory managers who supervised seasonal workers. Those managers in turn chased increased levels of productivity by reshaping the labour process to become more efficient, co-ordinated and specialized. Thus, the inland factories relied upon a two-pronged strategy of time measurement and labour discipline to map out the co-ordinated movements of tasks such as picking, roasting, sifting and sorting leaves in fine detail. This emphasis upon productivity, squeezing out a greater rate of output (tea) per labour input, constituted a strategy of labour-intensive capital accumulation.² Inland tea merchants, in other words, attempted to remain profitable in a

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¹ Huizhou was the name of an administrative region in imperial China, from the Song dynasty to the twentieth century. It encompassed present-day southern Anhui and north-east Jiangxi.

² Much of the conceptualization for my argument is indebted to Kaoru Sugihara's work on labour-intensive industrialization. For reasons I explain below, however, I

world of falling prices by asking seasonal labourers to work harder, faster and for less reward.

Although seemingly basic, this process, I believe, can help to resolve an enduring problem within the historiography of Chinese capitalism: how to reconcile the competing images of early modern commerce and of modern industrialization. Whereas scholars of Ming (1368–1644) and Qing China have emphasized the sophisticated nature of past institutions of exchange such as complex market networks for grains, textiles and salt, twentieth-century Chinese history remains animated by attempts to ‘catch up’ with global competition by improving the methods and tools of production. This contrast naturally raises the question of how and why, during this late nineteenth-century interregnum between the late imperial and the twentieth century, did an exchange-driven Chinese society become gradually driven towards productivity gains by way of industrialization.³

This question of ‘transition’ has often been approached by marking the earliest instances of mechanization in late Qing China.⁴ Indeed, one of the most persistent tendencies within Chinese historiography has been to equate ‘development’ with the introduction of human labour-saving technologies, such as fossil-fuel-powered steam-engines.⁵ Certainly, scholars have long recognized that Ming and Qing China witnessed impressive degrees of commercialization, especially in the realm of agriculture. However, according to many of the most notable economic historians, such as Mark Elvin and Philip Huang, this commercial activity ultimately ran up against the limits of pre-industrial growth. Huang argued that by the Southern Song

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prefer the term ‘accumulation’ to ‘industrialization’ to describe a broader historical dynamic.

³ Kenneth Pomeranz has also reiterated that the late nineteenth century remains the period in which scholars should look for ‘some very basic and as yet unresolved questions of modern Chinese history’: Kenneth Pomeranz, ‘Beyond the East–West Binary: Resituating Development Paths in the Eighteenth-Century World’, *Journal of Asian Studies*, lxi, 2 (2002), 573.

⁴ See, for example, Albert Feuerwerker, *China’s Early Industrialization: Sheng Hsuan-Huai (1844–1916) and Mandarin Enterprise* (New York, 1970); Kwang-Ching Liu, *China’s Early Modernization and Reform Movement: Studies in Late Nineteenth-Century China and American–Chinese Relations*, ed. Yung-Fa Chen and Kuang-Che Pan (Taipei, 2009), 167–8.

⁵ Kenneth Pomeranz, *The Great Divergence: China, Europe, and the Making of the Modern World Economy* (Princeton, 2000), 49.

(1127–1279) and early Ming, roughly the twelfth to fourteenth centuries, Chinese peasants had begun to exhaust the vitality of cultivable land, which led to diminishing returns on labour input, a phenomenon he labelled ‘involution’.⁶ Elvin shared the same Ricardian perspective while also emphasizing the social costs of cheap wages. Owing to China’s historically dense population, he argued, late imperial merchants naturally chose to continue taking advantage of cheap labour rather than invest meagre surpluses in capital improvements.⁷ Hence, without new technology, the Chinese peasantry remained in a state of ‘quantitative growth and qualitative standstill’, or ‘growth without development’. Qing agriculture was trapped in a holding pattern, waiting for the arrival of truly modern industry from Europe, the United States and Japan in the form of machines for processing cotton, silk and tea.⁸ If peasants and labourers worked harder back then, they did so not in order to accumulate capital (a cornerstone of modern social life) but simply to keep their heads above water in the face of Malthusian population pressures and Ricardian diminishing returns from the land.⁹

In recent decades, however, laudable research has demonstrated that late imperial China was far more economically advanced than once thought.¹⁰ But even this work continues to mark a sharp break between early modern commerce and modern industry along the lines of a technological divide. It attributes the ‘great divergence’ between China and England to the latter’s unique access to mineral-based energy sources that could replace human labour.¹¹ Thus, in so far as scholars have identified modern industry with labour-saving technology, they have also identified

⁶ Philip C. C. Huang, *The Peasant Family and Rural Development in the Yangzi Delta, 1350–1988* (Stanford, 1990), intro.

⁷ Mark Elvin, *The Pattern of the Chinese Past* (Stanford, 1973), 298–315.

⁸ See esp. *ibid.*, 315: ‘It was the historic contribution of the modern West to ease and then break the high-level equilibrium trap in China . . . Work done with and on foreign machinery trained the Chinese in modern technical skills, and laid the foundations of modern Chinese enterprise’.

⁹ See Mark Elvin, ‘The Historian as Haruspex’, *New Left Review*, lii (2008), 92 n. 16: ‘Economists will recognize Ricardo as the chief source of the idea of the “high-level equilibrium trap”’.

¹⁰ See, for example, Pomeranz, *Great Divergence*; Andre Gunder Frank, *ReOrient: Global Economy in the Asian Age* (Berkeley, 1998); R. Bin Wong, *China Transformed: Historical Change and the Limits of European Experience* (Ithaca, NY, 1997).

¹¹ Jack A. Goldstone, ‘Efflorescences and Economic Growth in World History: Rethinking the “Rise of the West” and the Industrial Revolution’, *Journal of World History*, xiii, 2 (2002), 361–77; Pomeranz, *Great Divergence*, 43–68.

such technology with Europe, and it has become almost natural to pit European industry against indigenous Chinese culture. This East–West framework, in turn, has produced a plethora of explanations for China’s inability to industrialize on its own, ranging from scientific knowledge to institutions to ‘geographic good luck’.¹² Although such explanations encompass cultural and social patterns, the ultimate indication of development has remained technological advancement.

This paradigm has animated the study of the late Qing tea trade, one of the most significant cash-crop economies in modern Chinese history. Through most of the eighteenth and nineteenth centuries, tea was by far the Qing empire’s most exported item. At its peak, nearly three hundred million pounds were shipped out annually to Europe and the Americas, constituting over half the value of overall exports from nineteenth-century China.¹³ And, as tea was one of the major global commodities of the nineteenth century, its trade was indissociable from that of South Asian opium, Caribbean sugar and British textiles.¹⁴ For most scholars of China, however, the history of tea symbolized not just the apogee of early modern Chinese commerce but also its ultimate failure. On the one hand, the export trade grew out of the most vibrant domestic networks of the seventeenth and eighteenth centuries, integrating peasants and merchants into an expansive global division of labour. On the other, those merchants soon lost their grip over the world market, and by the 1880s they were supplanted by the large-scale, partly mechanized plantations of colonial South Asia. Bearing this commercial defeat in mind, historians focused their attention on the lack of fixed capital, or investment in technology and infrastructure, in the Chinese tea districts. They concluded that rural Chinese society lacked

¹² Pomeranz, *Great Divergence*, 12; see also chs. 1–2. Two recent contributions to this literature also view capital-intensive technological change as the critical distinction marking European industry from the rest of the world: Prasannan Parthasarathi, *Why Europe Grew Rich and Asia Did Not: Global Economic Divergence, 1600–1850* (Cambridge, 2011); Jean-Laurent Rosenthal and R. Bin Wong, *Before and beyond Divergence: The Politics of Economic Change in China and Europe* (Cambridge, Mass., 2011).

¹³ Hsiao Liang-lin, *China’s Foreign Trade Statistics, 1864–1949* (Cambridge, Mass., 1974), 22–3, 117–19.

¹⁴ See, for example, Sidney W. Mintz, *Sweetness and Power: The Place of Sugar in Modern History* (New York, 1985), 108–23; Michael Greenberg, *British Trade and the Opening of China, 1800–1842*, 1st edn (repr. Cambridge, 1969).

spectacular ‘structural changes — fundamental alterations in the mode of production’, which relegated the tea trade to simply another instance of ‘growth without development’.¹⁵

There are analytical limitations, however, to an approach that asks why Chinese society failed to develop capital-intensive labour-saving tools and devices independently. First, the question is ‘modular’ in that it seeks to prove what has been presupposed: that China did not share the same historical experience of capitalist development as England.¹⁶ Furthermore, it flattens historical experience by anachronistically viewing the early modern world through the lens of twentieth-century industrialization.¹⁷ Certainly, capital-intensive labour-saving technologies became the *sine qua non* of economic growth in the last century. However, it would be an inductive fallacy, and more than a little Eurocentric, to equate the lack of those technical benchmarks with the lack of development in earlier periods, whether in China or elsewhere.¹⁸ Readers of this journal, for instance, may recall Frank Perlin’s acute observation that, in early modern South Asia, ‘economic development in the period before industrialization was mainly characterized by changes in the size and *organization* of circulating [as opposed to fixed] capital, and in its increasing control over large quantities of labour extensively dispersed through space in households and large workshops’.¹⁹ Thus, rather than asking *whether* China developed as England had done (clearly, the answer is ‘No’), it would be more instructive to ask *in what ways* integration into global markets was reshaping Chinese society.²⁰

One promising line of inquiry comes from the works of Jan de Vries and Kaoru Sugihara, who in recent decades have formulated a more robust concept of development prior to technological breakthrough, one in which labour intensification

¹⁵ Robert Gardella, *Harvesting Mountains: Fujian and the China Tea Trade, 1757–1937* (Berkeley, 1994), 54, 7.

¹⁶ Andrew Sartori, *Bengal in Global Concept History: Culturalism in the Age of Capital* (Chicago, 2008), 71.

¹⁷ Pomeranz, ‘Beyond the East–West Binary’, 554.

¹⁸ Jairus Banaji, *Theory as History: Essays on Modes of Production and Exploitation* (Chicago, 2011), 255–6; Kaoru Sugihara, ‘The Second Noel Butlin Lecture: Labour-Intensive Industrialisation in Global History’, *Australian Economic History Review*, xlvii, 2 (2007), 121; Wong, *China Transformed*, 14–15.

¹⁹ Frank Perlin, ‘Proto-Industrialization and Pre-Colonial South Asia’, *Past and Present*, no. 98 (Feb. 1983), 91.

²⁰ Sartori, *Bengal in Global Concept History*, 71.

played an expansive rather than a moderating role.²¹ They contend that the conventional emphasis on capital-intensive growth has overshadowed dynamic social histories of market-driven labour-intensive processes which — through the reallocation and absorption of household labour, increased specialization and market incentives — resulted in greater per capita output.²² As testament to the plausibility of these ideas, newer scholarship has begun to explore their theoretical implications for the early modern history of Europe, the twentieth-century East Asian miracle and, more recently, new comparative contexts such as South and South-East Asia, Latin America and West Africa.²³

For historians of China, the concept of ‘labour-intensive industrialization’ usefully provides a framework for understanding how competition among overseas capitalist firms during the eighteenth and nineteenth centuries could reshape the daily rhythms of local producers and peasants in China, long before the introduction of new capital-intensive technologies in the twentieth century. Before proceeding, however, it is important to clarify how ‘labour-intensive industrialization’ differs from ‘mere’ labour intensification. First, whereas past historians viewed labour-intensive agriculture as an attempt to moderate declining productivity, the concept of labour-intensive industrialization emphasizes conscious strategies by economic agents to raise productivity. Secondly, whereas those historians viewed actors as solely responding to natural and technological constraints such as land area and quality, the latter spotlights human motivations born out of social interactions, namely, the social determinations of the marketplace.²⁴ Thirdly, and consequently, both de Vries and Sugihara spotlight the social rather than the technological dimensions of economic development, namely, the training, recruitment, allocation and discipline of labour. An ‘industrious revolution’, they stress, requires not only more labour but also efficient, ‘good-quality’,

²¹ Jan de Vries, *The Industrious Revolution: Consumer Behavior and the Household Economy, 1650 to the Present* (Cambridge, 2008); Sugihara, ‘Second Noel Butlin Lecture’. Both authors acknowledge a debt to Akira Hayami, who first coined the term ‘industrious revolution’ in 1967.

²² De Vries, *Industrious Revolution*, 78.

²³ See Giovanni Arrighi, *Adam Smith in Beijing: Lineages of the Twenty-First Century*, 1st paperback edn (London, 2007), 32–9, 72–3; Gareth Austin and Kaoru Sugihara (eds.), *Labour-Intensive Industrialization in Global History* (Abingdon, 2013).

²⁴ De Vries, *Industrious Revolution*, 76–8.

well-disciplined labour. Naturally, this point also raises the question of how to understand labour discipline historically: as an optimistic or pessimistic process, through neoclassical or Marxian terms.²⁵

Returning to the historiography of Chinese capitalism, the concept of labour-intensive industrialization directs scholars away from looking exclusively at capital-intensive technologies towards examining, instead, labour-intensive processes that contributed to greater productivity. Specifically, the tea merchants of late Qing China, who accumulated their capital through patterns characteristic of early modern commerce, reshaped rural tea production in sync with higher productivity levels dictated by market competition, a phenomenon typically associated with modern industry — all before the arrival of new labour-saving technologies from abroad.²⁶ Domestic and overseas competition regularized trade, caused prices to fall and compelled merchants to cut costs by raising productivity. *Pace* Elvin and Huang, labour intensification in *this* sense was driven not by the ‘natural’ laws of overpopulation and land quality, but rather by the *social* tendencies of capital accumulation to compel greater output at lower cost. Tea merchants were not compensating for falling productivity but aiming to raise it.

Specifically, the evidence below will demonstrate that coastal merchants and inland factory managers made a conscious effort to subject workers to a regimen of timed activities. Consciousness of time and efficiency is, of course, an element already central to any standard account of capital-intensive productivity gains. Historically, ‘cutting-edge’ labour-saving devices such as the cotton gin or the steam engine were crucial for growth because they exceeded what human labour or extant technologies could accomplish in a given period. Labour-intensive productivity gains that were not accompanied by capital-intensive innovation, then, would require strategies aimed at more efficiently reorganizing labour itself, increasing the ratio of time spent on productive activity

²⁵ Sugihara, ‘Second Noel Butlin Lecture’, 135–8; de Vries, *Industrious Revolution*, 113–16.

²⁶ The phenomenon that I focus on here resembles what Banaji called ‘the subsumption of labour into merchant-capital’ or what Perlin simply called ‘commercial manufacture’. Among Chinese historians, Wong also described a process of expansive ‘proto-industrial’ production before the advent of capital-intensive labour-saving technologies.

relative to the overall working day.²⁷ Examples include absorbing idle labour into secondary activities, reallocating labour into more profitable sectors, or, as in the case below, monitoring the efficiency of the specialized activities themselves. This peculiar historical combination of time consciousness without accompanying technological innovation was observed decades ago by notable thinkers such as Max Weber, writing about eighteenth-century America, and E. P. Thompson, describing early modern Britain in this journal.²⁸ What these examples demonstrate for scholars is the larger theoretical point that what united the ‘industrious’ and ‘industrial’ revolutions was, above all, a more general drive towards greater productivity generated by the capitalist market. As such, ‘capital accumulation’ becomes a more descriptive category than ‘industrialization’ alone, since it accounts for capitalist expansion both in its early commercial and labour-intensive forms, and in its later industrializing and capital-intensive forms.²⁹

²⁷ Michel Aglietta commented upon the temporal dimension of ‘the intensification of labour’ as a strategy of increased productivity, which he described as an increase in the amount of time during which workers produce surplus value, instead of merely replacing the cost of inputs, within a constant working period: Michel Aglietta, *A Theory of Capitalist Regulation: The US Experience*, trans. David Fernbach (London, 1979), 49–50. Notably, Aglietta also suggested that because labour intensification relies upon old technologies to achieve new levels of productivity, it is too ‘complex’ for easy classification as either extensive or intensive growth. This question, however, appears less of a problem once we remind ourselves that the concepts in question are relative rather than absolute. For both the Marxian tradition and a neoclassical economist such as Sugihara, extensive growth (relative surplus value) is defined based on what intensive growth looks like (absolute surplus value) at a given moment and vice versa. Rather than attempting to pin down the exact contours of where different forms of growth begin and end, the more interesting question for studying intermediary processes such as labour-intensive industrialization is their long-run historical significance. The implication of this new literature is that labour intensification, formerly seen as a type of extensive growth, can be seen as a form of intensive growth, or, in Marxian terms, as part of the repertoire of relative surplus value creation. See Karl Marx, *Capital: A Critique of Political Economy*, i, trans. Ben Fowkes (London, 1976), 646; Sugihara, ‘Second Noel Butlin Lecture’, 135–6.

²⁸ Max Weber, *The Protestant Ethic and the ‘Spirit’ of Capitalism and Other Writings*, ed. and trans. Peter Baehr and Gordon C. Wells (New York, 2002), 14. Weber wrote, ‘In Benjamin Franklin’s birthplace (Massachusetts) at least, the “capitalist spirit” (in the sense in which we are using it) was undoubtedly present before any “capitalist development” had taken place’. See also E. P. Thompson, ‘Time, Work-Discipline, and Industrial Capitalism’, *Past and Present*, no. 38 (Dec. 1967), 79–81.

²⁹ See, for example, William H. Sewell Jr, ‘Crooked Lines’, *American Historical Review*, cxiii, 2 (2008), 404: ‘the endless accumulation of capital produces changing historical configurations of political power, spatial relations, class struggles, intellectual forms, technology, and systems of economic regulation that endure for a certain time until they are dismantled by their own contradictions and replaced by new configurations’. At issue here is the manner in which ‘industrialization’ implies a

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Tea merchants in nineteenth-century Huizhou were compelled along these same lines to increase productivity in order to survive amid a world market flooded with new teas grown on plantation-style 'tea gardens' in colonial Ceylon and India. In order to rationalize the roasting, rolling and sifting of teas, they measured the amount of necessary time spent on each task, designed instructions to minimize wasted activity, and used wages to provide workers with incentives to work as hard as their bodies allowed. A dearth of quantitative data prevents us from making definitive conclusions about the outcome of this strategy, but a combination of private handbooks, photographs and social surveys illustrates how merchants held a clear notion of productivity, and, consequently, consciously sought to economize labour through fixed measurements of time. In particular, the merchants of Huizhou deployed a millennia-old device for keeping time, incense sticks that burned at a regular rate, in order to keep pace with the modern and dynamic world market for tea. My argument does not hinge upon the degree of technical sophistication behind the sticks themselves, for they were certainly less accurate than mechanical clocks. Rather, merchants used the sticks to organize a regimen of fixed and abstract 'timed labour' resembling the systems of work discipline recognized by Thompson. It was the social context of the tea factory, then, rather than the incense sticks themselves, that endowed this pre-mechanical labour process with an industrial character.

In real historical terms, labour-intensive capital accumulation has meant nothing less than pushing older arrangements to their limits. De Vries has warned that the 'industrious revolution', despite its optimistic title, was not 'an admirable thing'. In Europe it resulted in the 'self-exploitation' of women and children, the neglect of family, lower literacy rates and greater incidences of 'binge drinking and binge leisure'.³⁰ Undoubtedly, similar tales can be found across world history and up to the present, not least in China today, where the

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localized focus on the evolution of a site, rather than placing that site within a broader, dynamic global context. For an extended treatment of these questions, see Perlin, 'Proto-Industrialization and Pre-Colonial South Asia', 42–51, 57–60.

³⁰ Jan de Vries, 'The Industrial Revolution and the Industrious Revolution', *Journal of Economic History*, liv, 2 (1994), 260.

majority of the world's manufacturing labour now lives. My analysis proceeds in three sections. First, I introduce the basic materials describing the tea merchants of Huizhou in the late Qing period. From the late eighteenth century, itinerant inland merchants travelling between Anhui, Canton and Shanghai gradually asserted greater control over the processes of tea cultivation and refinement. As a consequence, the merchants and factory overseers reshaped the labour process in order to raise productivity. I substantiate this claim through a detailed exploration of how a form of 'abstract' time regulated the tea production process, the clearest evidence for which will be an analysis of how labour overseers in Huizhou used incense sticks to regulate the efficient completion of tasks. These materials form the basis of the final two sections of this article.

II

HUIZHOU TEA: FROM GUEST TRADER TO TEA FACTORY

The rise of the export trade in Chinese tea, from the seventeenth century to the mid twentieth, can be imagined as two distinct eras bisected by the First Opium War (1839–42) and the attendant creation of the treaty port system.

From the 1610s, when the Dutch East India Company first took Chinese tea to Europe, until 1842, the Qing empire successfully restricted European trade to the southern port of Canton. As European enthusiasm for tea grew, foreign residents in China remained barred from entering the inland tea districts. Published accounts depicting the cultivation process, such as that of Jean-Baptiste du Halde, merely translated descriptions written by the Chinese literati.³¹ Even Samuel Ball, chief tea inspector in Canton for the British East India Company, confessed in a footnote to his memoirs that 'I have never seen tea made for sale, or which was fit for sale'.³² The British parliament gave trade with China a swift boost by passing the Commutation Act of 1784, reducing domestic tea taxes from over 100 per cent to merely 12.5 per cent. From 1784 to 1833, British tea imports more than

³¹ J.-B. du Halde, *Description géographique, historique, chronologique, politique, et physique de l'empire de la Chine et de la Tartarie chinoise* (1736).

³² Samuel Ball, *An Account of the Cultivation and Manufacture of Tea in China: Derived from Personal Observation during an Official Residence in that Country from 1804 to 1826* (London, 1848), 105.

doubled, from sixteen to thirty-three million pounds, and the now voracious demand for tea was one of several reasons for the declaration of war on the Qing in 1839.³³

As a consequence of military defeat, the Qing court agreed to open several treaty ports along the Chinese coast. The resultant system not only removed most restrictions on foreign trade, but also marked the first opportunity for European travellers to observe life in the rural tea districts. In 1847 the government of India employed the botanical collector Robert Fortune to explore the tea districts of China. Although he was the first European to travel through these regions, Fortune already knew which destinations he needed to visit: ‘the great green-tea country of Hwuy-chow [Huizhou]’ and ‘the far-famed Bohea [Wuyi]’ mountains of Fujian. His familiarity with Huizhou and the Wuyi mountains reflected their international reputation as the centre of China’s commercial tea production, a reputation earned from centuries of activity. In Bartholomew’s *Atlas of the World’s Commerce* produced in 1907, for instance, British cartographers represented the two regions of Huizhou and the Wuyi mountains as two halves of a single contiguous land mass of specialized tea production (see Plate 1).

The Wuyi mountains have received considerable attention from past studies, partly owing to their proximity to the more accessible Taiwan and the southern coast.³⁴ This article instead gives priority to the tea trade in Huizhou, both to characterize transformations affecting the export trade as a whole and also to provide a new account of how merchant capitalists in the region gradually remoulded the tea labour process consonant with the principles of productivity. In simple terms, we can identify three key moments in the transformation of the export trade: at first, local peasant producers sold their goods to itinerant ‘guest merchants’; then, during the nineteenth century, guest merchants became more involved in production; and finally, the merchants themselves undertook almost full responsibility for the management of production. This can be characterized, using

³³ Hoh-Cheung Mui and Lorna H. Mui, *The Management of Monopoly: A Study of the English East India Company’s Conduct of its Tea Trade, 1784–1833* (Vancouver, 1984), pp. xi, 146–7.

³⁴ See Gardella, *Harvesting Mountains*; Chen Ciyu, *Jindai zhongguo chaye de fazhan yu shijie shichang* [The Development of the Modern Chinese Tea Industry and the World Market] (Nangang, Taiwan, 1982).

the Chinese terms, as a development from ‘guest merchant’ (*keshang*) to ‘tea factory’ (*chachang*).

Before loose-leaf teas were ever sold to Dutch and British traders, people living in China had been drinking various forms of the beverage for over a millennium, from steamed pastes to hardened cakes. Loose-leaf teas began to emerge during the Yuan (1271–1368) and Ming dynasties, and detailed accounts of stirring and rolling whole leaves first appeared in the second half of the sixteenth century.³⁵ Tea production for European export began not long afterwards. The first creation was the Songluo green teas (Singlo in English), named after Songluo Mountain near Huizhou. According to local gazetteers, ‘during the reign of the Longqing emperor (1567–72), the Buddhist [monk] Dafang lived on Songluo Mountain near Xiuning. His technique was refined and skilled, so everyone emulated it, and it was called “Songluo tea”’.³⁶ The craze for Songluo tea travelled southwards, eventually reaching the Wuyi mountains in Fujian.³⁷

Monasteries in Fujian produced the first teas for export sold to merchants in Canton, but they did not spearhead the expansion of tea production. Their job was ‘entirely of turning around and selling it to the tea guests’. The term ‘guest’, short for ‘guest trader’, recurs constantly in materials from the early years of the tea trade. The ‘guest’ aspect implied both that the merchant was not settled in the place of production, but also that he specialized in transporting goods between different locales while investing minimal capital in production. During the period of the Canton trade (c.1757–1842), outsiders ‘entered the mountains and fought their way through brambles and bushes, moving hills and turning stones, growing plants in weeded areas’.³⁸

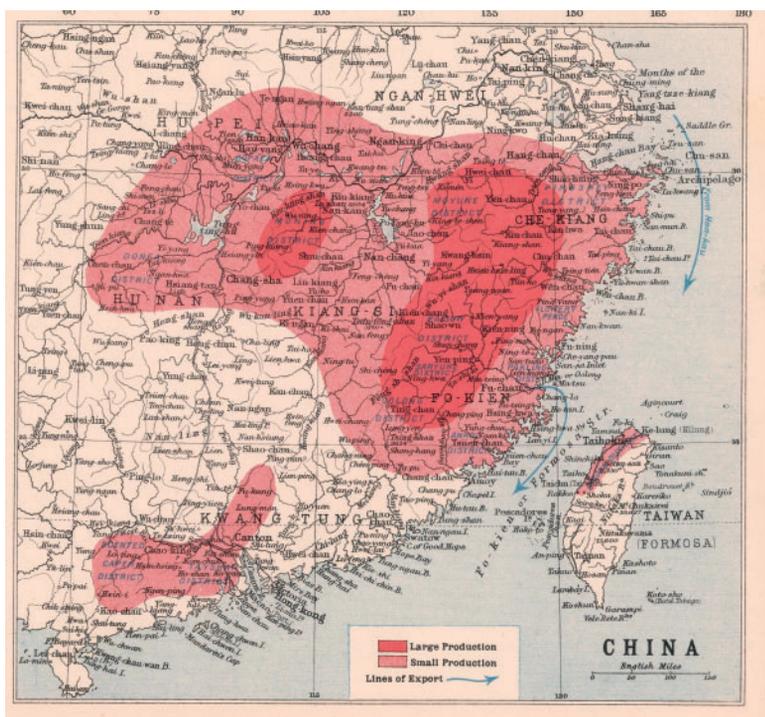
The tea districts in Huizhou, by contrast, suffered no shortage of local commercial activity. In fact, the merchants of Huizhou were one of the largest, most successful regional groups of merchants in late imperial China. Huizhou’s most famous son, the twentieth-century pragmatist reformer Hu Shih, recounted

³⁵ H. T. Huang, *Science and Civilisation in China*, vi, pt 5 (Cambridge, 2000), 528–9.

³⁶ Chen Chuan, *Anhui cha jing* [The Anhui Classic of Tea] (Hefei, Anhui, 1984), 35.

³⁷ Wu Shizhuan, quoted in *Zhongguo chaye lishi ziliao xuanji* [A Selection of Historical Materials on Chinese Tea], ed. Chen Zugui and Zhu Zizhen (Beijing, 1981), 336.

³⁸ Lin Fuquan, ‘Wuyi chaye zhi shengchan zhizao ji yunxiao’ (1943), in Xiao Tianxi (ed.), *Wuyi cha jing* [The Wuyi Classic of Tea] (Beijing, 2008), 632–8.



1. An economic–geographic representation of the chief tea-producing regions in eastern and southern China at the turn of the twentieth century. The darkest section on the right, indicating ‘large production’ of tea, stretches across the two regions of Huizhou in Anhui and the Wuyi mountains in Fujian. From *Atlas of the World’s Commerce*, ed. J. G. Bartholomew (London, 1907), 70. Image courtesy of the David Rumsey Map Collection, <<http://www.davidrumsey.com>>.

the legend of the land in his oral memoirs: ‘So rugged is the district that there is very little cultivable land’. As a result, ‘my people, the people in the mountainous area, have had to choose between starvation and going out to trade in the cities. They chose trade’.³⁹ Thus, a robust network of experienced merchants had already been installed in southern Anhui long before teas began to be exported overseas. When prices for Songluo teas rose sharply in the eighteenth century, families across Huizhou began to

³⁹ Hu Shih, ‘The People of Hui-Chou’ (1959), *Chinese Studies in History*, xiv, 4 (1981), 4–5.

harvest and sell teas modelled after the Songluo style. Although they continued to name the tea after the mountain, the newer products became known as ‘garden’ rather than ‘hill’ teas. A tea merchant in Canton named Tien Hing explained to a British inspector in the early 1800s, ‘The garden tea was first brought down to Canton in the present [Qing] dynasty to be sent to foreign places. The quantity then gradually augmented until every village began to plant it and to manure the ground’.⁴⁰

By far the most intact and illuminating body of materials from the late Qing tea trade is the personal archives of the Jiang family of Fangkeng village in Shexian county, Huizhou. Although officially a village, Fangkeng is barely more than a shaded row of houses that lies some thirty kilometres east of the central market town of Tunxi. Even today, finding Fangkeng is nearly impossible without catching a small motorboat across the Xin’an River, which winds across Huizhou. In the 1980s, historians from Anhui Normal University received an informal suggestion that they contact the Jiang descendants, who had told friends about their trove of Qing era documents, which numbered in the thousands. The materials turned out to provide one of the most in-depth and personal records of late imperial economic life available to Chinese historians yet.⁴¹

The Jiang tea merchants from Fangkeng village could trace their business activities to the middle of the Ming. Their genealogy documents how Jiang Kejian (1659–1712) ‘used a licence to become a pedlar in order to accumulate some capital’.⁴² The licence mentioned here refers to a salt licence, since salt constituted the ‘financial backbone’ of the merchants of Huizhou from the sixteenth to the nineteenth centuries.⁴³ Only with Jiang Kejian’s great-grandson Jiang Youke (1792–1854) did the clan enter the Canton tea trade. The Jiang family found themselves squarely in the middle of massive commercial

⁴⁰ Quoted in Ball, *An Account of the Cultivation and Manufacture of Tea in China*, 211–12.

⁴¹ These materials have been recorded in local history collections in Chinese, but they have never been analysed in English-language writing. See, for example, Hu Wulin, *Huizhou cha jing* [The Huizhou Classic of Tea] (Beijing, 2003).

⁴² *Huishang yanjiu* [Research on the Merchants of Huizhou], ed. Wang Tingyuan and Zhang Haipeng, 2nd edn (Hefei, Anhui, 1995), 578.

⁴³ Qitao Guo, *Ritual Opera and Mercantile Lineage: The Confucian Transformation of Popular Culture in Late Imperial Huizhou* (Stanford, 2005), 51. See also *Huishang yanjiu* [Research on the Merchants of Huizhou], ed. Wang and Zhang 7, 173–9.

changes in early modern China. In the early eighteenth century, Jiang Youke and his son Jiang Wenzuan (1821–62) opened a tea shop, where they bought leaves from local peasants, refined and sifted them in their makeshift workshops, and took them to Canton to be sold overseas.

While the Jiang family pivoted from salt to tea, merchants from the neighbouring county of Wuyuan originally focused their attention on timber. The timber trade was historically important, not just because chronologically it anticipated tea, but also because it provided the template for local merchants to establish a foothold in production. Timber was distinct from trades such as salt, which was extracted in Yangzhou, because the timber itself was supplied locally. ‘In the production areas’, the historian Shigeta Atsushi wrote, ‘the merchants would buy up timber, tie it together onto rafts, and sell it to consumers downstream, where they would take a profit from the differences in price’. At this early moment in itinerant domestic trade, ‘the most representative form’ taken by the merchants of Huizhou was that of the ‘guest trader’. Although they added labour to the product, ‘merchants expended almost all their energy on transport and circulation, and from there they extracted the greatest amount of profit’.⁴⁴

The tea merchants of Wuyuan borrowed this ‘representative form’ of guest trading and applied it to tea. During the years of the Canton trade, merchants did become involved in production, but their intervention was minimal. So subsidiary was production to transport that, in his account of the trade with Canton in the early 1800s, the merchant Tien Hing did not even mention the processes of refinement.⁴⁵

In the decades following the creation in 1842 of the treaty port system, tea exports reached levels ten times higher than on the eve of the First Opium War. In official gazetteers published in the late decades of the century, Shigeta noted, ‘It would be almost impossible to find someone not involved in the tea trade somehow’. He traced over a hundred new tea companies founded during the last third of the century. Consequently, the phrase ‘carving out a career through tea (*yecha qijia*)’ became ‘the

⁴⁴ Shigeta Atsushi, *Shindai shakai keizaishi kenkyū* [Research on the Modern Social and Economic History of the Qing] (Tokyo, 1975), 311–12.

⁴⁵ Ball, *An Account of the Cultivation and Manufacture of Tea in China*, 223.

most ubiquitous phrase in the biography section' of these gazetteers. In short, 'the tea trade became the most magical industry of the time'.⁴⁶

When the Canton trade diminished in the 1850s, there was no question for Jiang Youke and Jiang Wenzuan that they should transfer their business to Shanghai. The immediate trigger was the Taiping rebellion (1850–64), which blocked transport routes to the south, but Shanghai itself was also gradually gaining momentum as the new commercial and financial capital of the Qing empire. As exports rose, however, prices fell, a relationship visible from overlaying maritime customs statistics for exports with the total value of green tea sold during the late nineteenth century (see Figure).

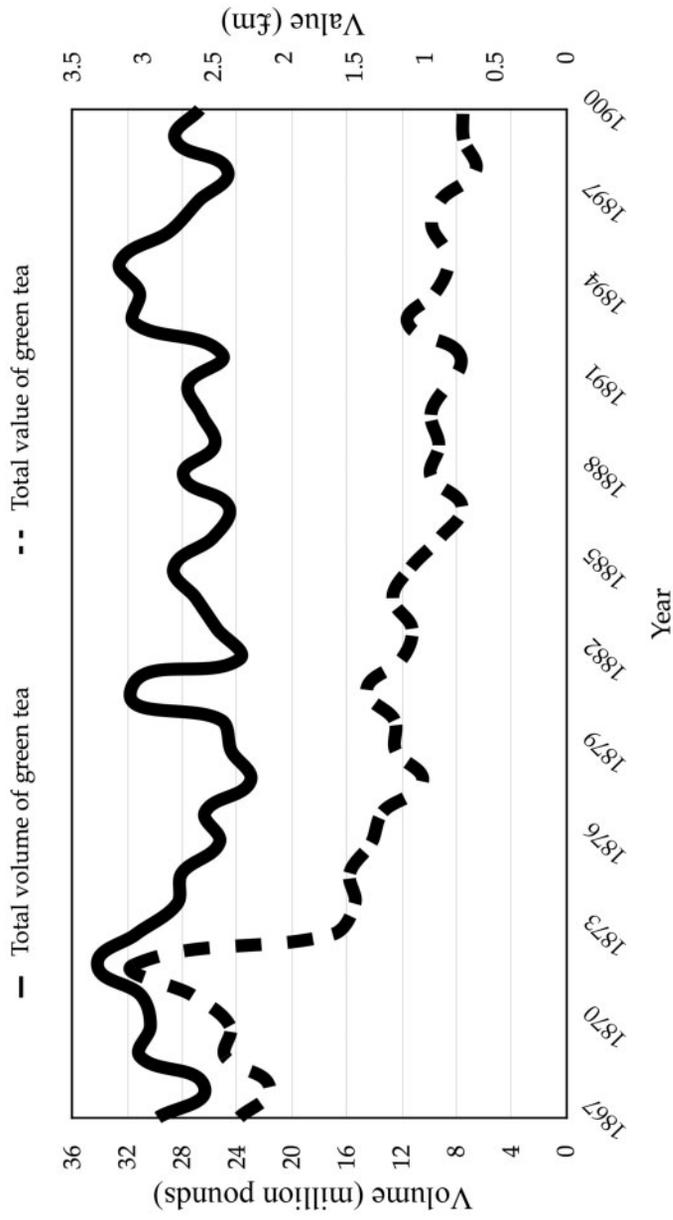
Falling prices hit the Jiang family hard. Less than twelve months after arriving in Shanghai, Jiang Youke died at the age of 52. Jiang Wenzuan continued the business but confided in a letter to his concubine, 'As far as the tea we are selling in Shanghai is concerned, we were caught off guard when the foreign merchants refused to pay higher prices. The opening prices were very low, and business has not been smooth'. Finally, indebted to numerous other merchants, Wenzuan declared, 'the family business is in crisis; it is vanishing to nothing. It's hard to get enough to eat. Our family struggles to survive each passing day'.⁴⁷ In the early 1860s, Jiang Wenzuan died on the road to Shanghai. His eldest son, Jiang Yaohua, was only 15 years old at the time. The family was forced to sell their property, and Jiang Yaohua had to look for a job elsewhere.

As further testament to the magical pull of the tea trade during this era, however, the youngest Jiang found little alternative but to try his own hand at tea when he grew older, despite having witnessed the ruin of his father and grandfather. Penniless at first, he eventually saved enough money from odd jobs to open his own tea shop in Suzhou. There, according to family legend, Jiang Yaohua crossed paths with a famous Qing official, who introduced him to a large tea broker based in Shanghai. He came to an agreement with this broker, named Tang Yaoqing, who was interested in buying teas from Huizhou. Jiang served

⁴⁶ Shigeta, *Shindai shakai keizaishi kenkyū*, 316–17.

⁴⁷ *Huishang yanjiu*, ed. Wang and Zhang, 584.

TOTAL VOLUME AND VALUE OF GREEN TEA EXPORTS FROM CHINA, 1867–1900*



* Source: This figure was created by the author using data from Thomas P. Lyons, *China Maritime Customs and China's Trade Statistics, 1859–1948* (Trumansburg, 2003).

as a middleman for Tang, from which he saved enough capital to open up another shop of his own back in Huizhou, on a scale much larger than the retail store he ran in Suzhou.⁴⁸

For over four decades, Jiang Yaohua set up seasonal tea factories every spring in the market town of Tunxi, in Huizhou. The location alone indicates a consolidation of production and circulation, since nearly all tea-related transactions across Huizhou were now concentrated in the one site. During this period in the late nineteenth century, the tea factories are said to have employed between a hundred and a thousand people each season. The younger Jiang used at least thirteen different names to run his activities, doing business with over a dozen Shanghai brokers. He employed nearly twenty permanent staff in management and service positions, as well as dozens of temporary manual workers for roasting, fanning, sifting and sorting leaves.⁴⁹ In short, Jiang Yaohua's ventures grew along with the Shanghai trade, and eventually he operated an enterprise far more complex than that of his father and grandfather. His story gives substance to a general observation that Shigeta had glossed from the biographies in gazetteers: that in the late nineteenth century those involved in tea were no longer 'simply tea merchants who specialized in travelling back and forth between the production districts and the trading ports', nor 'simply middlemen', but now 'also oversaw the production process to the end. They realized features of intensive production'.⁵⁰ Already by 1967, when Shigeta conducted the first specific study on Huizhou tea, he could speculate on the modern intensive techniques of production in the tea factories. Subsequently unearthed materials, the next section will show, would vindicate his claim.

III

INSIDE THE FACTORY

Although the earliest tea merchants in Huizhou could earn a comfortable living based solely on the differential between the

⁴⁸ *Ibid.*, 585.

⁴⁹ *Ibid.*, 584–6.

⁵⁰ Shigeta, *Shindai shakai keizaishi kenkyū*, 318.

cost of leaves at home and the prices paid in Canton, greater competition over time eroded the rate of profit, and margins could only be salvaged by developing more efficient methods of production. The first two generations of tea traders in the Jiang family fared reasonably well when the Canton market was artificially limited by the monopoly of Chinese merchants, known as the Cohong. When the two men moved their business to Shanghai, they encountered a very different business climate. In Shanghai, Jiang Wenzuan wrote, 'the profits are not great, but business is fast'. 'Compared to the Canton business', he noted elsewhere, 'it's extremely tough to make money. One tough year just leads to another!'⁵¹ Jiang Youke and Jiang Wenzuan had relied upon relatively loose, makeshift workshops that could be fitted into a few rooms in their house. When Jiang Yaohua re-entered the trade decades later, he increased the scale of production in order to compete better on the Shanghai market.

In years both good and bad, efficient manual tea production was crucial to the collaboration between Jiang Yaohua and his partner in Shanghai, Tang Yaoqing. As an instance of a good year, we may take a letter Tang addressed to Jiang. Tang opened by saying, 'reserves of green teas for export are low' and his company needed new supplies from inland:

If we are not quick, then we need you to be decisive and pay attention to manpower (*renshou*), to act with guts and move quickly to supply us with a thousand *dan* [about ten thousand pounds] of leaves. Ship them quickly to Shanghai, and we can definitely get fat profits . . . We hope you can quickly get us tea supplies. Find your men and get to work, and if prices stay strong and your goods are high-quality, then we will ask for eight hundred more *dan* of tea.

While speed helped Jiang Yaohua to respond favourably to high prices in good years, in poor years efficiency reduced production costs and maintained hopes of profit. Many of Tang's letters conclude, 'Next year, our soundest strategy is to be more selective about quality, push down mountain [raw material] prices and cut costs (*chengben*)'.⁵²

The word *chengben* refers to the general outlay of capital and expenses, but historically it has often denoted production costs in particular. *Chengben* was always a concern to merchants, but as tea shops took over production of the final product, they paid even

⁵¹ *Huishang yanjiu*, ed. Wang and Zhang, 584.

⁵² *Ibid.*, 592, 597–8.

closer attention to the cost of materials and labour. In a small handbook assembled by Jiang Yaohua entitled *An Outline for Buying Tea (maicha jielüe)*, he emphasized the importance of calculating costs prior to buying *maocha* (raw, unprocessed leaves) from peasants. According to custom, tea-growing peasant households would take the raw leaves to a central market area and haggle with the inland merchants over prices. Jiang cautioned that, before buying tea, one must ‘first use the scales to determine how much and what quality silver one has’. Then ‘count up the total costs for charcoal, labour, packaging, transport and *lijin* [transport] taxes, and boat fees. Use these to calculate the total outlay (*chengben*) and only then begin to talk prices’. Jiang also detailed the specific types of leaf that could be successfully sold. One should look for leaves that are ‘fine and young, with a dark green colour, round body, tightness’. Conversely, he also warned against leaves

whose flavours are not right, with yellow stems, are thin and weakly bent, with red spots and stems, are dead or rotten, hard and white, with old veins, without sweet flavour when steeped in water, without a lingering taste (*huiwei*), or with an astringent taste that rushes through the nose — these types are not worth buying.

Though all factories aspired to adhere firmly to these principles, prices were beyond their control. A quick survey of the Jiang account books demonstrates that during the 1898 season Jiang Yaohua paid an average of 0.192 *yuan* per *jin* of raw leaves, but in 1906 he paid a rate of 0.297 *yuan*. Furthermore, just as inland tea factories could not fully tame mountain prices, or the cost of *maocha* sold by peasants, neither could they fully prepare for Shanghai prices, which had crept down throughout the second half of the nineteenth century. The opacity of the markets in the treaty ports was compounded by the fact that more producers were crowding the world tea trade. In the 1903 season, the merchants of Shanghai reported that ‘with Ceylon now producing so much tea, the foreigners haggle on the pretext that Ceylon tea is high-quality and very flavourful, and Chinese dealers don’t know if they’re telling the truth. This makes it even harder for Chinese dealers to sell their goods’.⁵³ Surrounded on both sides by the unpredictability of global markets and the prices of raw materials from peasant

⁵³ *Ibid.*, 587–8, 598.

households, inland merchants realized the importance of controlling the only costs they could directly influence: the costs of production in the refinement processes. Thus, production costs moved from the margins of their considerations to the centre.

These concerns are apparent in another manual written by Jiang Yaohua during the last decades of the century. In a 10,800-character document entitled *An Outline for Making Tea* (*zuocha jielüe*), Jiang meticulously detailed every step in the production process of the various green teas of Huizhou. Whereas earlier texts by connoisseurs had merely sketched the steps in tea-making regardless of scale and efficiency, Jiang's handbook described how to produce large amounts of tea in minimal time. Central to this process was a regimen of work organized around timed intervals, the crucial mechanism for which was a particular type of non-mechanical timekeeping device: incense sticks that burned at a regular rate.

Consider the futility of lighting sticks of incense in a factory for processing raw tea. The woody smell of wilted tea-leaves, especially a roomful of them, is intense, almost nauseating to novices. This, combined with the steady stream of smoke emanating from burning stoves, impaired the original function of the incense, as factory workers were probably only vaguely aware of the aroma. Nevertheless, for twelve hours each day, when operations were under way, everyone in the factory remained constantly mindful of the slow-burning sticks. These timekeepers were available in various lengths and burning speeds, but they were generally designed to last forty minutes per stick. Incense regulated every occupation and individual operation in the tea-making process: roasting, sifting, weighing, sorting, dyeing and packaging (see Plates 2 and 3).

Of all the tasks, the most important duty in the tea-making cycle was shouldered by the tea roasters, who were also burdened with the most exacting instructions:

Once the *maocha* are brought into the tea shop, they undergo their first roasting.⁵⁴ In Wuyuan county, this is known as 'pulling out dampness' (*tuochaoshen*), and in Xiuning and Shexian counties, this is called 'expelling the little ones' (*chuxiaohuo*).

⁵⁴ 'Roasting' (*qia*, or *chao*) refers to heating the leaves in a pan over an open fire. It is sometimes also translated as 'stir-frying'.

In every pot, 1.85 *jin* [one gram] of leaves can be fired in the time it takes to burn two and a half to three sticks of incense. When the leaves are first placed in the pot, instruct the roasters to stir the leaves around in cool air to shake out the sour, musty smell from the leaves. Do this until about 80 per cent to a full stick of incense has been used, then do not air the leaves any further. The roasters must then concentrate, using a light touch to rotate the pot as they press down the leaves, evenly distributing the heat. Do this for half a stick of incense.

Lay the pot directly over the furnace and roast until two and three-quarters of a stick of incense have been burned, rub them once more, and take them out of the pot. By now, the leaves must be vibrant and green in colour, tightly rolled but not crumbling. The *maocha* that first come into the shops cannot be packed tightly. In order to avoid causing the leaves to lose their original green colour and become red and yellow, they need to be quickly taken off the flame and packaged immediately.⁵⁵

At first sight, the idea of relying upon incense sticks to regulate industrial production is puzzling. Considering the low level of technology required for these non-mechanical timekeepers, Chinese peasants must have been using incense sticks for centuries prior to the nineteenth century. How novel or noteworthy, then, could this labour arrangement really have been? The first documented record of incense timekeepers in China can be traced to the sixth century, when the poet Yu Jianwu (487–550) wrote:

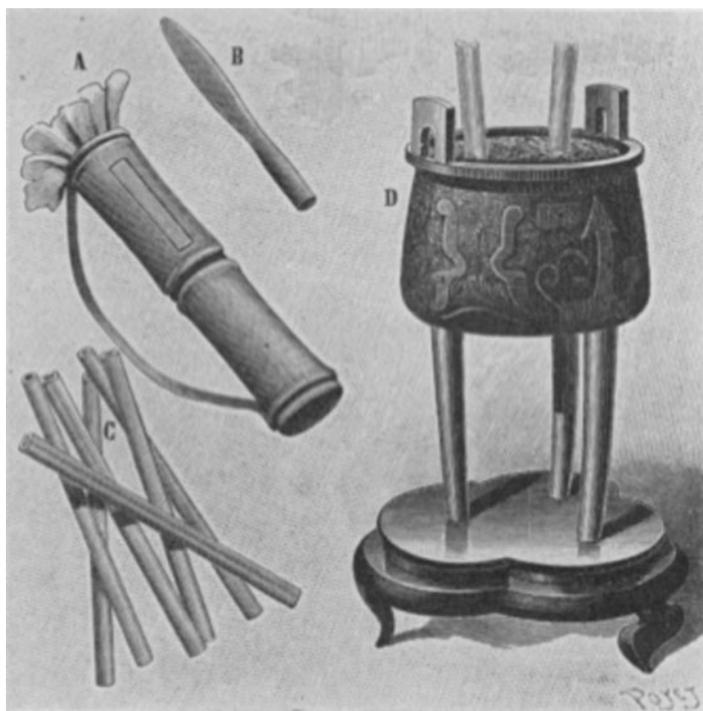
By burning incense [we] know the o'clock of the night,
With graduated candle [we] confirm the tally of the watches.⁵⁶

Presumably, from at least the Tang dynasty (618–907) onwards, incense sticks were used regularly, and they persisted into the twentieth century, when several foreign sources confirmed their presence in the daily life of China. An American diplomat travelling in the late nineteenth century noted that rich farmers would sell water to peasants and calculate prices based on the 'quantity of water which flowed from the wheel during the burning of a given length of an incense stick'. Farmers in Gansu used incense sticks to measure the time needed to pour water for irrigating their land.⁵⁷ And Rudolf Hommel, a German photographer travelling in the

⁵⁵ Hu, *Huizhou cha jing*, 152–3.

⁵⁶ Quoted in Silvio A. Bedini, *The Trail of Time: Time Measurement with Incense in East Asia* (Cambridge, 1994), 54; my thanks to Dorothy Ko for pointing out this valuable text.

⁵⁷ *Ibid.*, 55.



2. Incense sticks and a burner, engraving.

From Mathieu Planchon, *L'Horloge: son histoire rétrospective, pittoresque et artistique* (Paris, 1898), 253, repr. in Silvio A. Bedini, 'The Scent of Time: A Study of the Use of Fire and Incense for Time Measurement in Oriental Countries', *Transactions of the American Philosophical Society*, liii, 5 (1963), 24.

1920s, noted that coalminers 'stay underground continuously for about three hours, and to tell the time they carry with them an incense stick which glows for about three hours. The Chinese call it "Time-piece"'.⁵⁸ Again it is worth asking, how noteworthy was the deployment of incense in the Jiang tea factory? To answer this question, we must delve deeper into the relationship between labour and different conceptions of time.

⁵⁸ *Ibid.*; Rudolf P. Hommel, *China at Work: An Illustrated Record of the Primitive Industries of China's Masses, Whose Life Is Toil, and thus an Account of Chinese Civilization* (New York, 1937), 4.



3. Tea roasters, c.1885, photograph (detail).

Behind the head of the man in the middle there is a bundle of sticks which resembles the incense timekeepers featured in Plate 2.

From 'Drying tea leaves, circa 1885', Baker Library Historical Collections, Harvard Business School, Tea Industry Photograph Collection, olwvork710902.

IV

CONCRETE AND ABSTRACT TIME

The phenomenon of labour-intensive capital accumulation that I have proposed here describes a process of efficiency, which in turn hinges on measuring activities within time. It is thus unsurprising that historians and anthropologists have frequently remarked how the rise of industrial capitalism coincided with qualitative changes in the perception and consciousness of time among workers and farmers. For instance, time in the early modern British countryside appeared to the farmer as something contingent upon external, natural phenomena such as the crow of the cock or pastoral chores:

Labour from dawn to dusk [wrote E. P. Thompson] can appear to be 'natural' in a farming community, especially in the harvest months: nature demands that the grain be harvested before the thunderstorms set in . . . sheep must be attended . . . cows must be milked; the charcoal fire must be attended . . .

Thompson described this natural time as 'task-orientation'.⁵⁹ The category clearly also applied to the demanding schedules of rural life in imperial China. Natural events organized the tea trade linearly: tea plucking only began after the Qingming festival in April, raw leaves needed to be dried immediately after plucking, and *maocha* needed to be roasted again within twenty-four hours of preparation. Tea production was always task-oriented.

It has been claimed, however, that a great divergence between West and East emerged with the advent of clock time in Europe. Alongside the rise of industrial capitalism, mechanical timekeeping displaced natural time as the regulator of daily life. Greater attention to accurate clocks was necessary for the mechanical, calculable work of industry: what Thompson called 'timed labour'. Until now, the horological history of China — or the study of the history of time — has been dogged by pessimism and failure. David Landes claimed that daily activities in Tang and Song (960–1279) China were regulated 'by the diurnal round of natural events and chores', or patterns of natural time.⁶⁰ Imperial China did not graduate to the modern

⁵⁹ Thompson, 'Time, Work-Discipline, and Industrial Capitalism', 60.

⁶⁰ David S. Landes, *Revolution in Time: Clocks and the Making of the Modern World* (Cambridge, Mass., 1983), 25.

usage of accurate, commensurable time units until the arrival of European technologies. This failure appears paradoxical since scientific knowledge during the Tang and Song was sophisticated enough to keep independent measurements of time accurately, and yet these devices were not used to regulate daily activities within the populace.⁶¹ The juxtaposition of accurate timekeeping devices with the predominance of task orientation suggested to the sinologist Joseph Needham that technological progress in a vacuum is insufficient without a corresponding cultural desire to popularize it. This paradox became known as the Needham problem: why did Chinese civilization 'not spontaneously develop modern natural science as Western Europe did, though China had been much more advanced in the fifteen pre-Renaissance centuries'?⁶² Building upon Needham's work, Landes wrote that 'productivity, in the sense of output per unit of time, was unknown' in imperial China.⁶³

The opposition between a time-disciplined Europe and a task-oriented Asia has become less tenable in recent years. In particular, Landes and Needham both seem to have exaggerated the difference between pre-modern and modern forms of timekeeping. Moishe Postone helpfully reinterpreted the relationship between the two, offering the category of 'abstract' time, which he described as the inversion, rather than the opposite, of 'concrete' time. The operative distinction was 'whether time is a dependent or an independent variable'. Concrete time was a 'function of events' and referred to 'particular tasks or processes'. Abstract time, by contrast, was 'independent of events'.⁶⁴ Many critics have disputed such an opposition for being simplistic and mechanical.⁶⁵ Although

⁶¹ This early tradition culminated with the polymath Su Song (1020–1101) and his waterwheel-powered clock, paired with an escapement mechanism, which beat drums and rang bells at every *ke* (quarter-hours of fourteen minutes and twenty-four seconds) and every *shi* (double hours): Joseph Needham, Wang Ling and Derek J. de Solla Price, *Heavenly Clockwork: The Great Astronomical Clocks of Medieval China* (Cambridge, 1960), ch. 4.

⁶² Joseph Needham, *Science in Traditional China: A Comparative Perspective* (Hong Kong, 1981), 131. See also Landes, *Revolution in Time*, 23–4.

⁶³ Landes, *Revolution in Time*, 25.

⁶⁴ Moishe Postone, *Time, Labor, and Social Domination: A Reinterpretation of Marx's Critical Theory* (Cambridge, 1993), 201–2.

⁶⁵ See, for example, Paul Glennie and Nigel Thrift, *Shaping the Day: A History of Timekeeping in England and Wales, 1300–1800* (Oxford, 2009).

valid, such concerns, I think, can be allayed with the caveat that the history of abstract time has been highly context-dependent. Conceptions of independent, abstract time did not emerge *ex nihilo*; rather, they derived from earlier methods of time measurement, such as those based on sunrise and sunset (the day) or the phases of the moon (the month). Such natural events once determined the duration of units of time, but eventually the units themselves began to determine the expected pace and quantity of work. The passage from concrete to abstract time, therefore, was subtle. Rather than inventing a new type of time consciousness, the keepers of abstract time inverted the relationship between human activity and the measurement of time.⁶⁶

Given the logical coexistence of concrete and abstract time, then, the predominance of the former in the Chinese countryside should not preclude the possibility that there may have emerged specialized realms of life wherein the latter achieved major significance. In particular, although the pace of the tea trade was constrained by the seasonal and physiological limits of the tea plant, merchants also attempted to increase productivity during working hours by imposing a disciplined regimen of abstract timed labour.

Such processes can be clearly demonstrated through a closer examination of the practical effects of using incense sticks to regulate tea-leaf roasting in Huizhou. The amounts of time Jiang specified, such as cooling the leaves for the time it took to burn one stick, at first appears to be dictated by the physical properties of the leaves: fanning the leaves for the burning of one incense stick was an ideal period of time because it resulted in the best-tasting tea that fetched good prices. Through years of experience, Jiang Yaohua, and the industry as a whole, must have observed that a roaster, on average, could most efficiently roast 1.85 *jin* of tea in the time required to burn three sticks of incense. These measurements were based upon natural processes and thus constituted a determination of concrete time.

Given these physical limits on productivity, however, Jiang had proceeded to design a work regimen that maximized the amount of time spent roasting leaves in a continuous manner throughout the working day. Strategies of labour-intensive industrialization,

⁶⁶ Postone, *Time, Labor, and Social Domination*, 201–2.

recall, do not so much raise productivity by overcoming technical and physical limits as maximize the amount of time spent working in a given period. The tea factories mapped out the precise movements involved in roasting tea because they expected roasters to work all day, roasting as many baskets as possible within those hours. According to Jiang's handbook, the working day lasted as long as eighteen sticks of incense, or six baskets of leaves per roaster.⁶⁷ In the 1930s, social surveyors found that tea factory production remained essentially the same as it had been in Jiang Yaohua's day, and factories still burned eighteen sticks per day. The surveyors further noted that this period of time took an immense toll on the workers' bodies: 'The time it takes to burn all eighteen sticks of incense spans from approximately 5 a.m. to 5 p.m., in total just over twelve hours. During that time, however, one day of roasting labour completely depletes all muscle strength'.⁶⁸

The work schedule, in other words, was designed to push against the physical limits of human-based tea production. Roasters needed to complete each basket of leaves within the specified three-incense stick interval in order for the factory to squeeze in six cycles of roasting. Thus, it was crucial that factory managers 'command' the roasters to perform certain movements at specified intervals. Those intervals, for example, eight-tenths of a stick, had now been transformed from a measurement of activity into a 'normative measure for activity'.⁶⁹

Because incense sticks were such an old technology, observers could be tempted to dismiss this new function as historically insignificant. But precisely because of its long history, the deployment of incense to regulate specialized tasks demonstrates clearly that the emergence of abstract time did not require the invention of new technologies such as a mechanical clock, just as industrial capitalism as a social dynamic did not need to wait for the arrival of new machines.⁷⁰

⁶⁷ Hu, *Huizhou cha jing*, 166.

⁶⁸ Fan Hejun, 'Tunxi chaye diaocha', *Guoji maoyi daobao*, ix, 4 (1937), 120–2.

⁶⁹ Postone, *Time, Labor, and Social Domination*, 214–15.

⁷⁰ E. P. Thompson made this point when he suggested that the earliest periods of English industry featured 'no Cadillacs, steel mills, or television sets to serve as demonstrations of the onset of a new era'. Thompson, 'Time, Work-Discipline, and Industrial Capitalism', 80.

The subtle inversion between task and time in the workshops of Huizhou does not merely contravene Landes's assertion that the cultural standard of 'busyness' immunized imperial China against Western notions of 'productivity'. It also turns the Needham problem on its head. Rather than remaining baffled at why Chinese society wasted its opportunities to exploit accurate timekeeping technology, Jiang's handbook demonstrates how the most traditional and purportedly primitive technologies could be, and were, deployed as tools of industrial labour management. The emergence of abstract time was less a matter of accuracy than a desire or need for accuracy. What was crucial in these burgeoning social forms, then, was not the appearance of new mechanical clocks but the different functions to which technologies, old and new, were put to use.

Finally, the radical implications of the subtle emergence of abstract time became more visible decades later, when field researchers provided new information about the system of wages. In the 1930s, Fan Hejun, a reformer looking to improve the rural tea industry, took extensive notes on tea production in Tunxi.⁷¹ The particular factory he observed still used incense sticks to regulate labour, eighteen sticks in total divided into intervals of two or six. Although the specific figures differed slightly from those in Jiang Yaohua's manual, the system remained similar:

Eighteen sticks of incense are one working day (*gong*). Because the supplementary firing requires more time, six sticks of incense count as one shift (*lun*). The workers who are more skilled can roast four baskets (*lou*) of tea in one shift. Those who are not skilled can only roast two baskets. When they have finished roasting for one shift, the skilled roasters then roast four more baskets, but there are still six sticks of incense remaining, and so they burn four more baskets. Finally, all eighteen sticks of incense are burned up . . .

Taking four baskets as one shift, the skilled workers can earn four units of wages (*sige danwei gongzi*), with each unit worth one *jiao* four *fen* four *li* [about fifteen cents]. The unskilled workers who can only roast two baskets per shift only earn, in the span of eighteen incense sticks, two units of wages. This is the situation for the supplementary roasters. . . .

Thus, wages are calculated this way: for a given amount of baskets (*ruogan lou*) roasted during each shift, they receive a given amount of wages (*ruogan danwei gongzi*).

In other words, the tea factories used a system of piece wages, as opposed to time wages. Again, at first glance, piece wages appear

⁷¹ Fan, 'Tunxi chaye diaocha', 120–2.

to escape the element of productivity and time-discipline (the sense of 'time is money') which forms the basis for the modern industrial labour process. Whether one roasts a basket of leaves in one hour or two should be immaterial to the basket's price. The idea that piece-rates were a symbol of pre-industrial, unhurried work charmed Thompson, among others.⁷² A nineteenth-century British political economist even claimed that 'Piece-workers are in fact their own masters, even whilst working upon the capital of the employer'.⁷³

But the distinction between piece and time wages in this sense is a red herring. In practice, it did not matter whether wages were calculated by the hour or by the piece. Rather, what mattered was the underlying basis for how much a 'piece' was really worth, and the basis for this was productivity, which ultimately was also a time-based determination. If the piecework of the past felt so leisurely and comfortable, workers did not owe their comfort to the system of payments but rather to the fact that they were still independent of disciplined work. For instance, the tea peasants who brought their leaves to market grew them on their own land with their own tools and labour. The market price for tea compensated them, with a profit, for both their labour and their capital inputs (fertilizer, seeds, etc.).⁷⁴ By contrast, the seasonal workers in the tea factories had no pretensions to owning any of the tools or raw materials, so their only contribution was their labour. Their wages were calculated purely on the basis of the going rate for labour itself, which was determined both by the availability of workers (never in short supply in Huizhou) and by average productivity. Although masquerading as something distinct, then, piece-rates for seasonal factory workers were simply another version of time wages: money paid to compensate labour.

Furthermore, contra Thompson's expectations, piece-rates were actually more conducive to the intensification of labour. If the tea roasters were paid only a normal day rate based upon working eighteen incense sticks, that is, twelve hours, the

⁷² Thompson, 'Time, Work-Discipline, and Industrial Capitalism', 75, 92.

⁷³ John Watts, quoted in Marx, *Capital*, trans. Fowkes, 692.

⁷⁴ See, for example, *Qimen hongcha zhi shengchan zhizao ji yunxiao* [The Production, Manufacture and Sale of Qimen Black Tea], ed. Sun Wenyu (Nanjing, 1936), 22–35; *Tunxi lücha zhi shengchan zhizao ji yunxiao* [The Production, Manufacture and Sale of Tunxi Green Tea], ed. Sun Wenyu (Nanjing, 1936), 7–14.

clumsy roaster would be paid the same amount as his skilled colleagues, despite producing half the output. But because piece wages were determined by the total number of baskets, the factory paid the skilled worker twice as much as the clumsy one. The wage system rewarded individuals who worked more quickly and efficiently, even though all the individuals laboured for the same number of hours.

Seen in this light, piece wages appear as a more ruthless system than time wages.⁷⁵ Perhaps one of the clearest supporting pieces of evidence for this is the fact that the tea factories reserved the harsh conditions of the piece-rate system for the most abject, least valued workers: women and migrants. In general, the majority of factory workers were local men, who gravitated towards the least arduous jobs, such as sifting leaves. These men received a stable daily wage, including food and lodging, and their meals were 'high-quality, and at every meal they are served some meat'. The female tea sorters and the migrant tea roasters, by contrast, were employed in a casual labour system (*sangong*, literally 'scattered labour'), and neither food nor housing was provided. As with the roasters, the women were paid by the piece: 'Every day, if they sort four shifts' worth of leaves, or ten *jin*, then they receive wages of four hundred *wen*. The Wuyuan sorters have the best technique, and in one day they can sort five shifts for a total of six hundred *wen*'.⁷⁶

Fan Hejun, the researcher from the 1930s, was most noticeably disturbed by the working conditions of the tea roasters. Tea roasting was reserved for seasonal workers from the impoverished town of Anqing, west of Huizhou. Because employers did not contribute to food and housing costs, the roasters had to pay one *yuan* out of their own pockets per day to stay at a hostel, about one-third of their wages. They also ate poorly. For lunch, 'because they must actively prepare for the

⁷⁵ This recharacterization of the piece wage even held true for the English context that Thompson wrote about. Although he believed that industrial capitalism would phase out piecework in England, the piece-rate system in London not only persisted into the nineteenth century but actually enjoyed a renaissance. Because factory labour legislation limited working hours, factory owners placed a premium on efficiency, and piece wages (in Marx's words) 'provide[d] an exact measure of the intensity of labour'. Hence, in English sweatshops subject to the Factory Act, four-fifths of workers were paid by the piece. 'The piece-wage', Marx concluded, 'is the form of wage most appropriate to the capitalist mode of production'. Marx, *Capital*, 694, 698–9.

⁷⁶ Fan, 'Tunxi chayе diaocha', 120–2.

afternoon shifts, they cannot eat much. At about 11 a.m., they bring out some uncooked rice they have brought with them, place it in an enamel container inside an iron can and put it on the fire to cook slowly'. And the work itself routinely pushed the roasters to their physical limits. Just reading descriptions of their daily routine is enough to make the reader sweat:

Of all the work for producing tea for export, roasting is the most bitter (*ku*). This is because roasters are required to lean into the stove fire, and during the spring and summer the intense sun blazes mercilessly down, and together the sun and the stove gang up on the worker . . .

The factory we observed had eighteen rows of stoves in total, with six stoves per row, making a total of ninety-eight (*sic*). At the busiest time, they could employ forty-nine men working at the same time. A fire is lit between two stoves positioned back to back, with the fire heating the pots from below and the men standing on the outside. But next to this pair of stoves is another pair, and so groups are aligned one behind the other, with only a narrow space separating each row. Two back-to-back stoves are separated by only fifty-three centimetres, and only seventy centimetres separate them from the next row. The workers stand between the rows, facing one another, a whole row of men directly facing the fire. The heat is extreme, but if the stoves could be spaced further apart, then the heat would be slightly reduced. On the basis of a study of this one factory, the rows are too packed, and the spaces where the men stand are nothing less than a steam basket (*zhenglong*) . . .

Because the labour is so strenuous, the workers sometimes come down with sunstroke, to the point where they fall down dead. There is no shortage of such cases.⁷⁷

These twentieth-century surveys presented a detailed picture of the tea labour process to a general readership for the first time. But even in the late nineteenth century, unpublished personal documents were already providing a window into the daily life of factory workers. Among the materials in Jiang Yaohua's personal archive was a folk-song he had written in thirty-six stanzas, in which he described the tea trade in colloquial rhyming couplets. Four stanzas in the middle focus on the workers in the tea factories, and suggest that, even during the best years of the trade, the factory managers worked the men and women to the point of exhaustion.⁷⁸

The work manager must be most dignified, shouting commands and raising his voice.

Watching the fire intently, in one day he burns many incense sticks.

⁷⁷ *Ibid.*, 122.

⁷⁸ Hu, *Huizhou cha jing*, 199–203.

Industrious, the most pitiable tea roaster, sweat stains his shirt, now half red.
Bent back, crooked waist, both hands busy, in a past life he must have been a loafer.

The tea sifters line up in order, just like the shakers and fanners.
The overseer wants them to work harder and puts out some cold food.

The roaster works night after night, three shifts and he still hasn't gone home.
He agrees to come in early tomorrow morning, wages to chase away the sleep demons.

V

CONCLUSION

Given the ubiquity of incense timekeepers in East Asian societies, it would be difficult to argue that this particular deployment of incense sticks to raise labour productivity was unique to the tea trade. Furthermore, those familiar with the historiography of Chinese capitalism are well aware that many of the individual features of 'proto-industrialization' (monetization, specialization, wage labour, etc.) existed as far back as the economic revolutions of the Tang and Song dynasties.⁷⁹ But what distinguishes the most recent several centuries of Chinese (and world) history is not only the presence of these features but also the unprecedented degree to which the compulsion to grow and produce for the marketplace has come to dominate everyday life. What the documentary evidence presented here provides for us is a clear and discrete picture of the qualitative changes experienced by tea producers immediately following a historic spike in demand from overseas, when merchants and overseers subsequently exerted an exceptional degree of managerial discipline over the workforce. While the earliest tea merchants were merely itinerant 'guests' indifferent to tea manufacture, by the turn of the twentieth century they had developed a

⁷⁹ See Elvin, *Pattern of the Chinese Past*, chs. 9–13; Robert M. Hartwell, 'Demographic, Political, and Social Transformations of China, 750–1550', *Harvard Journal of Asiatic Studies*, xlii, 2 (1982). For an overview of the Chinese-language historiography on proto-capitalism, see Arif Dirlik, 'Chinese Historians and the Marxist Concept of Capitalism: A Critical Examination', *Modern China*, viii, 1 (1982), 108–13.

standardized system for timed labour which demanded speed and co-ordination.

The incense stick system of Huizhou was a local variant of a more general pattern of labour-intensive capital accumulation, in which commerce encouraged greater labour productivity during a period of pre-mechanized manufacture. For further proof of this relationship, we need only look at the other exporting tea-growing regions of nineteenth-century Asia. In the famed Wuyi mountain region of Fujian, factory managers organized workers into a 'machine-like' (*ru jixie*) arrangement for rolling and roasting leaves.⁸⁰ Likewise, planters in the north-east Indian territory of Assam concentrated their efforts on recruiting and disciplining workers to perform specialized tasks.⁸¹ In both regions, managers devised idiosyncratic methods to expand the working day and to link remuneration to output per unit of time.⁸² The astronomical growth in world tea exports during this time was therefore the result not of labour-saving innovations but of back-breaking labour performed in factories and plantations scattered across Asia. It would not be surprising to discover similar tales from other single-commodity sectors which contributed to the pre-mechanical global division of labour.⁸³

Looking forward, how should we characterize the relationship between labour- and capital-intensive efforts to raise productivity? Historians of China have often portrayed the arrival of machinery from overseas at the turn of the twentieth century as a radical rupture with the pre-modern past. By contrast, recent economic historians have argued that labour-intensive industrialization

⁸⁰ Lin, 'Wuyi chaye zhi shengchan zhizao ji yunxiao', 685.

⁸¹ Rana P. Behal, 'Power Structure, Discipline and Labour in Assam Tea Plantations under Colonial Rule', in Rana P. Behal and Marcel van der Linden (eds.), *Coolies, Capital, and Colonialism: Studies in Indian Labour History* (Cambridge, 2006), 160.

⁸² Lin, 'Wuyi chaye zhi shengchan zhizao ji yunxiao', 673–4; Behal, 'Power Structure, Discipline and Labour in Assam Tea Plantations under Colonial Rule', 159. Behal describes how tea gardens calibrated clocks in Assam to maximize the amount of time spent working in daylight. I will compare the systems of time management in Chinese and South Asian tea production more fully in a future manuscript.

⁸³ For example, Sven Beckert has recently foregrounded the land and labour-intensive dimensions of pre-mechanized and slave-based cotton cultivation during the earliest moments of industrial capitalism: Sven Beckert, *Empire of Cotton: A Global History* (New York, 2014), pp. xv–xviii. Sidney Mintz made a similar argument with regard to West Indies sugar plantations: Mintz, *Sweetness and Power*, 48–52.

provided a path that 'prepared' economic actors for eventual capital-intensive industrialization.⁸⁴ However, in the specific case of Chinese tea for export, labour-intensive capital accumulation did more than prepare merchants for capital improvements. Compelled towards greater productivity by market dynamics, the same merchants who sold tea, silk and cotton allied themselves with the gentry (many of whom had themselves received their start in overseas trade) to demand technological advances and eventually spearhead early twentieth-century economic reforms. Thus, while the late Qing tea factories were heirs to past generations of itinerant merchants, they were also direct forerunners of the twentieth-century campaigns to 'catch up' with Japan and Europe. The historically crucial turn towards industrialization in twentieth-century China, then, requires more than an analysis of technology; it also requires an account of economic ideology: new ideas and attitudes towards commodity production that preceded the physical introduction of industrial technologies. Rather than being interpreted as an exogenous break with the past, twentieth-century industrialization becomes more intelligible as an extension of subtle labour-intensive dynamics, stemming from world trade, that had been reshaping life in the Chinese countryside since the eighteenth and nineteenth centuries.

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⁸⁴ Sugihara, 'Second Noel Butlin Lecture', 144.