

Constructing a Census of Chinese Regional Industrialization for 1933

*The Case of Jiangsu and Guangdong Provinces*¹

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Abstract

Industrialization in China over the course of the twentieth century has been spectacular. Yet, the spread of industrial development has been very uneven. In this paper, we will construct a dataset on regional manufacturing for 1933, just before the industrial take-off in the twentieth century. Given the sheer size of China, we will focus on two provinces, i.e. Jiangsu (including Shanghai) and Guangdong, both of which have been associated with a large manufacturing sector. By combining the first large scale industrial census conducted by D.K. Lieu with a large number of smaller censuses, surveys, and statistical reports, we are, for the first time, able to provide regional estimates of output value for the whole manufacturing industry by sector and region as well as for the number of modern factories and their employees.

Introduction

The Chinese economy has grown spectacularly since the twentieth century. Partly this is due to the great transformation that made China (one of) the biggest manufacturing economies in the world with industry making up no less than 33 per cent of the total economy today. This evolution has drawn considerable attention to the early stages of industrialization in Republican China (1911-1949). Yet, it was the year 1933 in

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Map 1 China provinces Jiangsu and Guangdong

which China witnessed the first substantial industrial census, conducted and published by D.K. Lieu , and which form the basis of most estimates of industrial production during the Republican period.² For example, partly relying on these data, Ou Pao-San was the first to attempt to the increasingly common national accounting approach to estimate the national value added for industrial sectors for 1933.³

Even though mostly focused on the national level, some studies on Republican China still provide us with some rare quantitative regional information. Stimulated by the call for regional comparisons by Pomeranz, increasingly studies emerge which focus on the Lower Yangtze Delta in the 1930s.⁴ For example, Ma offered estimates on annual growth ratios of industry, covering modern and handicraft sectors in 1914/1918 and 1931/1936 for the lower Yangtze region, being, together with Guangdong, the place where early industrialization originated.⁵

2 D.K.Lieu, *Industrial survey in China* (Shanghai 1937) (刘大钧, 《中国工业调查报告》, 上海: 经济统计研究所1937年。).

3 P.S.Ou et al., *National income of China:1933* (Shanghai 1947)(巫宝三等人: 《中国国民收入: 1933年》, 上海: 中华书局, 1947年。).

4 K. Pomeranz, *The great divergence. China, Europe, and the making of the modern world economy* (Princeton 2000).

5 D.B. Ma, 'Between cottage and factory. The evolution of Chinese and Japanese silk-reeling industries

Yet, such studies are limited mostly due to lack of regional data.

In this paper we will remedy this lack of regional data. We start by defining the classification and coverage of manufacture industry in the year 1933 in the second section. In the third section we construct for Jiangsu and Guangdong provinces, a comprehensive regional dataset, including total values by sectors and physical output by main products, at both provincial and county levels. In section 4, we put our datasets in perspective by comparing them with other existing datasets, followed by a brief explanation of regional industrialization for both Jiangsu and Guangdong provinces and a short conclusion in section 5. These estimates for Jiangsu and Guangdong provide a point of departure, which we will extend for other provinces of China, the result of which is expected to be published in the *Quantitative Economic History Series of China* in the second half of 2019.

The classification and coverage of manufacture industry in 1933

D.K. Lieu conducted and published the most complete and comprehensive industrial census in pre-war China, in which a modern classification of industry, offered by the International Labour Office, was first introduced. It classified industry in sixteen sectors, 87 sub-sectors, and 161 sub-sectors. By separating mining from these sixteen industry sectors offered by Lieu, Ou provided us with a classification of manufacture industry including fifteen sectors and 51 sub-sectors. In addition, since military factories were not included in Ou's estimates, we supplement the military manufacturing sector as a sixteenth sector, covering weapon manufacture and warship building as two sub-sectors (see Table 1).

Table 1 Sectors and sub-sectors in our classification of manufacturing in 1933

Sectors	Sub-sectors
1. Lumber & Wood products	1.1 Sawmilling
	1.2 Wood Products
	1.3 Cany bamboo, Willow and Straw-made Articles
2. Machinery	2.1 Foundry

in the latter half of 19th century', *Journal of The Asia Pacific Economy* 10:2 (2005) 195-213; D.B. Ma, 'Economic growth in the Lower Yangzi region of China in 1911-1937. A quantitative and historical analysis', *Journal of Economic History* 68:2 (2008) 355-392.

Sectors	Sub-sectors
	2.2 Machine Building and Repairing
3. Metal Products	3.1 Metal Appliances
	3.2 Currency
4. Electrical Appliance	
5. Transport Equipment	5.1 Ship Building and Repairing
	5.2 Vehicle Building and Repairing
6. Soil & Stone	6.1 Brick and Tile
	6.2 Glass and Glassware
	6.3 Ceramics
	6.4 Lime
	6.5 Other Soil and Stone
7. Water, Electricity & Gas	7.1 Water
	7.2 Electric Power
	7.3 Gas
8. Chemical Products	8.1 Match
	8.2 Match Stem-chip
	8.3 Candle and Soap
	8.4 Enamel
	8.5 Artificial Fat
	8.6 Paint
	8.7 Inedible Oil
	8.8 Drugs and Cosmetics
	8.9 Acid-Base and Other Chemicals
9. Textile	9.1 Cotton
	9.2 Cotton Yard
	9.3 Cotton Cloth
	9.4 Silk Reeling
	9.5 Silk Weaving
	9.6 Wool Textile
	9.7 Hemp Spins
10. Clothing	
11. Rubber & Leather	11.1 Leather
	11.2 Leather Products

Sectors	Sub-sectors
	11.3 Rubber
	11.4 Rubber Products
12. Beverages & Foods	12.1 Rice-hulling
	12.2 Flour
	12.3 Tea
	12.4 Tobacco
	12.5 Brewing
	12.6 Sugar
	12.7 Salt
	12.8 Oil
	12.9 Soft Drink
	12.10 Egg
	12.11 Other Beverages and Foods
13. Paper & Printing	13.1 Paper
	13.2 Paper Products
	13.3 Printing
14. Accessories & Instruments	
15. Miscellaneous	
16. Military Industry	16.1 Weapon
	16.2 Warship building

Source: *Ou Pan-San (1947)*.

Construction of regional datasets

There are three sources that provide us with direct, though limited, information on the manufacturing industry for the Jiangsu and Guangdong provinces. First, as mentioned above, 1933 witnessed the first and only comprehensive industrial census in Republican China (1911-1949). This census, conducted by D.K. Lieu, covered a total of seventeen provinces and four major industrial centers (Shanghai, Nanjing, Beiping and Qingdao). Detailed information on the gross output value, physical output, number of factories, number of employees, type of materials and fuel consumed, for sixteen sectors of manufacturing industry were included as outlined above. The census consists of three volumes.

The statistical information for the Chinese-owned modern factories on the provincial level was reported in volume two, with the definition of Chinese-owned modern factories being the establishments which employed 30 or more employees and used mechanical power. Detailed statistical information on sub-provincial level for Chinese-owned modern factories, as well as for parts of the handicraft factories, were reported in volume three.

As far as Jiangsu and Guangdong are concerned, volume two of the census records detailed statistical information for 1,522 Chinese-owned modern factories in Jiangsu (including Shanghai) and 228 Chinese-owned modern factories in Guangdong, only a small part of which have their exact location within Jiangsu and Guangdong indicated. In addition, they exclude information on the military factories and foreign-funded factories. For those reasons, volume three of the census reported statistics for modern factories and partial handicraft for 29 counties in Jiangsu and eleven counties in Guangdong individually, thus leaving a substantial portion of handicraft industry in other counties in Jiangsu and Guangdong uncovered.

In the second source, Ou Pan-San made two improvements compared to Lieu's survey:

(1) He added 49 Chinese-owned modern factories and 68 foreign-funded modern factories in Jiangsu without specifying their exact location within Jiangsu;

(2) Ou obtained further data for seven sectors (fourteen sub-sectors) in Jiangsu as well as for six sectors (ten sub-sectors) in Guangdong for county level;

(3) Estimates at the provincial level were made by Ou for four sectors or nine sub-sectors for Jiangsu, as well as for four sectors or six sub-sectors for Guangdong. In making these modifications, Ou aimed to make supplements for the sectors without handicraft employment or with a small portion of handicraft employment in Lieu's census.

Table 2 Sectors and sub-sectors on county and provincial levels by Ou

Sectors	Sub-sectors	Jiangsu	Guangdong
Lumber & Wood products	Sawmilling	-	-
	Wood Products	-	-
	Cany bamboo, Willow and Straw-made Articles	-	-

Sectors	Sub-sectors	Jiangsu	Guangdong
Machinery	Foundry	C	C
	Machine Building and Repairing	C	C
Metal Products	Metal Appliances	-	-
	Currency	C	-
Electrical Appliance		-	-
Transport Equipment	Ship Building and Repairing	-	-
	Vehicle Building and Repairing		-
Soil & Stone	Brick and Tile	-	-
	Glass and Glassware	C	-
	Ceramics	P	P
	Lime	P	P
	Other Soil and Stone	C	C
Water, Electricity & Gas	Water	C	C
	Electric Power	-	-
	Gas	C	-
Chemical Products	Match	P	P
	Match Stem-chip	P	P
	Candle and Soap	-	-
	Enamel	C	C
	Artificial Fat	C	-
	Paint	C	C
	Inedible Oil	-	-
	Drugs and Cosmetics	C	C
Acid-Base and Other Chemicals	C	-	
Textile	Cotton	-	-
	Cotton Yard	-	-
	Cotton Cloth	-	-
	Silk Reeling	-	-
	Silk Weaving	P	-
	Wool Textile	P	-
	Hemp Spins	P	-
Clothing		-	-
Rubber & Leather	Leather	-	-

Sectors	Sub-sectors	Jiangsu	Guangdong
	Leather Products	-	-
	Rubber	-	P
	Rubber Products	C	C
Beverages & Foods	Rice-hulling	-	-
	Flour	-	-
	Tea	P	P
	Tobacco	-	-
	Brewing	-	-
	Sugar	P	-
	Salt	P	-
	Oil	-	-
	Soft Drink	-	-
	Egg	-	-
	Other Beverages and Foods	-	-
Paper & Printing	Paper	-	-
	Paper Products	-	-
	Printing	C	C
Accessories & Instruments		-	-
Miscellaneous		-	-
Military Industry	Weapon	-	-
	Warship building	-	-

'C' refers to data offered by Ou on county level, 'P' refers to data offered by Ou on provincial level, A dash (-) refers to sub-sector without data on either county or provincial level. Source: Ou Pan-San (1947)

As a third source, Ma provided a complete provincial estimate of manufacture industry for Jiangsu. In his estimate, the modern factories were derived from D.K. Lieu and a small part of the handicraft industry was derived from Ou Pan-San. For most other handicraft sectors, he just applied rough estimates for the missing sectors using agricultural raw material output as proxies. For example, for the cotton yarn sub-sector, since there is no provincial level hand-spun cotton yarn data, Ma used the Jiangsu share of raw cotton production to estimate its share of hand-spun yarn.

In sum, even though they greatly improved our knowledge of manufacturing, due to the limitations of the data they collected these three publications are still likely to underestimate the actual output value.

In addition, they only provide very limited sub-provincial information. Therefore, they have to be supplemented with other quantitative sources.

Indeed, when the National Government was founded in Nanjing in 1927, a large number of governmental departments and private associations, recognizing the need for statistical information, began to compile industrial statistics in a more or less systematic way. These new surveys were conducted on three different levels of aggregation: provincial-level, county-level, and sector-level. Starting with the provincial level, with the exception of D.K. Lieu's survey, the other main provincial survey was conducted by the International Trade Bureau of the Ministry of Industry, under control of the national government. This office published regional and local surveys of industry and commerce covering 5 provinces. Jiangsu was the first province where a comprehensive provincial-level survey was carried out and published in 1933 under the name *China's industrial Chronicles (Jiangsu Province)*.⁶ In 1937 a similar survey was published as *Investigation Report on Basic Industries, Special Industries and Rural Side-industry in Guangdong Province* by the Guangdong branch of the National Economic Construction Campaign Committee. These censuses recorded industrial activities in 1932 and 1932-1936 respectively, including the number of factories, location of factories, the amount of capital, the number of employees, wages, physical output, output value, and raw materials consumed.⁷

Second, provincial and municipal governments as well as research organizations conducted county-level studies and surveys in the early 1930s, in both Jiangsu and Guangdong. These were mainly published in an economic journal named *Industry and Commerce Bimonthly*.⁸ Third, sector-level industry studies and surveys were carried out by both government departments and private associations. So were surveys conducted for the sectors of Electrical Power, Silk Reeling, Oil, Acid and Other Chemicals, Accessories and Instruments, Military Manufacture, and Miscellaneous.⁹

6 The International Trade Bureau of the Ministry of Industry of the National Government (ed.), *China's industrial chronicles: Jiangsu province* (unpublished 1933) (国民政府实业部国际贸易局编:《中国实业志(江苏省)》1933年。).

7 The Guangdong branch of the National Economic Construction Campaign Committee (ed.), *Investigation report on basic industries, special industries and rural side-industry in Guangdong Province* (unpublished 1937) (国民经济建设远东委员会广东分会编:《广东省基本工业、特殊工业和农村副业调查报告书》1937年。).

8 Business Access Office of Ministry of Industry and Commerce of the National Government (ed.), *Industry and Commerce Bimonthly 1931-1933* (Beijing 2016) (国民政府工商部工商访问局编:《工商半月刊》1931年-1933年, 国家图书馆出版社2016年出版。).

9 See: Construction Committee (ed.), *China's electrical industry statistics, fourth edition* (unpublished

These three types of new sources allow us not only to examine and improve the overview of the modern factories from Lieu and Ou, but also to supplement the handicraft industry. First, as shown in Table 3, compared to Lieu and Ou, we totally supplement 234 modern factories for Jiangsu, and 53 for Guangdong, specifically providing the related information as exact location of these factories, number of employees, wages, physical output, and output value. All Chinese-funded factories are derived from such sources as *China's industrial chronicles (Jiangsu Province)*, *China's electrical industry statistics*, and *China's power plant statistics*. All foreign-funded factories are derived from *China's electrical industry statistics*, and *China's power plant statistics*. All military factories are derived from *Materials of ordnance industry archive in modern China*.

Table 3 Comparison of the number of modern factories in this text with those reported by Lieu and Ou for Jiangsu and Guangdong

Types of factory	Lieu	Ou	This text
Chinese-funded factories	1,747	1,789	2,053
Foreign-funded factories	-	68	85
Military factories	2	-	6
Total	1,749	1,857	2,144

Second, as far as handicraft industry is concerned, based on *China's industrial chronicles (Jiangsu Province)* and *Investigation report on basic industries, special industries and rural side-industry in Guangdong Province* we were able to make improvements on both county and pro-

1934) (建设委员会编:《中国电气事业统计(第四号)》1934年。); Construction Committee (ed.), *China's power plant statistics* (unpublished 1932) (建设委员会编:《中国电厂统计》1932年。); Y.D. Jin, 'Status and prospects of China's Tung oil industry', *China Construction* 14:5 (1936) 1-19 (金宜庄,《中国桐油业现状及其前途》,《中国建设》1936年第14卷第5期第1-19页。); B.X. Lieu, 'Summary of alcohol industry in China', *Statistics Quarterly of Guangxi* 2 (1937) 25-48 (刘炳新,《中国酒精工业概况》,《广西统计季报》1937年第2期第25-48页。); National Economic Council (ed.), *Sugar industry report* (unpublished 1936) (全国经济委员会:《制糖工业报告书》1936年。); Editorial Committee of Materials of Ordnance Industry History in Modern China (ed.), *Materials of ordnance industry archive in modern China* (Beijing 1993) (《中国近代兵器工业档案史料》,北京:兵器工业出版社1993年。); B.J. Tan and G.J. Chen, 'Summary of ivory carving industry in Guangzhou', *Industrial Statistics* 3:6 (1935) 170-208 (谭炳基,陈光杰,《广州市象牙雕刻业概况》,《实业统计》1935年第3卷第6期第170-208页。); Z.S. Zhang and Z.H. Zhang, *Yearbook of Shun Pao* (Shanghai 1934) (张粹生,章倬汉,《申报年鉴》,上海:申报馆特种发行部1934年); B.J. Zhou, 'Summary of production and marketing of raw silk in Guangdong province', *Monthly Journal of Trade*, 11 (1942) 53-96 (周伯俊,《广东生丝产销概况》,《贸易月刊》1942年第11期第53-96页。); M.Y. Zhu, 'Tung oil industry in China', *Monthly Journal of the Bank of China* 14:4 (1937) 27-39 (朱美予,《中国桐油业》,《中行月刊》1937年第14卷第4期第27-29页。).

vincial levels. As can be seen in Table 4, we improved four sectors (seven sub-sectors) in Jiangsu and eight sectors (fifteen sub-sectors) in Guangdong on the county level. Furthermore, as indicated in Table 4, we added quantitative information on the provincial level for totally twelve sectors (22 sub-sectors) in Jiangsu and nine sectors (nineteen sub-sectors) in Guangdong. Of these totally 21 sectors, for six sectors, besides above-mentioned sources, we used special surveys conducted for sectors such as silk reeling, sugar, and inedible oil. Yet, for the remaining sectors we use an eclectic approach to arrive at rough estimates (for a description of these methods see Xu and Van Leeuwen).¹⁰ For example, by utilizing depreciation rates of transport equipment as proxies, we can arrive at the sector of transport equipment for both provinces by estimating replacement rates. Likewise, using agriculture raw material output as proxies, such sub-sectors as sawmilling, rice-hulling, flour, and oil for both provinces were estimated. For the sub-sectors of wood, bamboo, metal, electrical appliance, brick, candle, accessories and miscellaneous for both provinces, clothing for Jiangsu as well as brewing for Guangdong, we can take regional samples on consumption records of such subsectors as proxies to arrive at their provincial production.

Table 4 Sectors and sub-sectors on county and provincial levels by this text

Sectors	Sub-sectors	Jiangsu	Guangdong
Lumber & Wood products	Sawmilling	P	P
	Wood Products	P	P
	Cany bamboo, Willow and Straw-made Articles	P	P
Machinery	Foundry	-	-
	Machine Building and Repairing	-	-
Metal Products	Metal Appliances	P	P
	Currency	-	-
Electrical Appliance		P	P
Transport Equipment	Ship Building and Repairing	P	P
	Vehicle Building and Repairing	P	P
Soil & Stone	Brick and Tile	P	P
	Glass and Glassware	-	C
	Ceramics	-	-

¹⁰ These proxies have already been explained in detail in: Yi Xu and B. van Leeuwen, 'China in world industrialization', *China Economist* 11:6 (2016) 98-109.

Sectors	Sub-sectors	Jiangsu	Guangdong
	Lime	-	-
	Other Soil and Stone	-	-
Water, Electricity & Gas	Water	-	-
	Electric Power	C	C
	Gas	-	-
Chemical Products	Match	-	-
	Match Stem-chip	-	-
	Candle and Soap	P	P
	Enamel	-	-
	Artificial Fat	-	-
	Paint	-	-
	Inedible Oil	-	-P
	Drugs and Cosmetics	-	-
	Acid-Base and Other Chemicals	-	C
Textile	Cotton	P	P
	Cotton Yard	P	P
	Cotton Cloth	C	C
	Silk Reeling	P	P
	Silk Weaving	-	C
	Wool Textile	-	C
	Hemp Spins	-	C
Clothing		P	C
Rubber & Leather	Leather	C	C
	Leather Products	P	C
	Rubber	P	-
	Rubber Products	-	-
Beverages & Foods	Rice-hulling	P	P
	Flour	P	P
	Tea	-	-
	Tobacco	P	C
	Brewing	C	P
	Sugar	-	P
	Salt	-	-

Sectors	Sub-sectors	Jiangsu	Guangdong
	Oil	P	P
	Soft Drink	P	C
	Egg	C	-
	Other Beverages and Foods	C	C
Paper & Printing	Paper	C	C
	Paper Products	C	C
	Printing	-	-
Accessories & Instruments		P	P
Miscellaneous		P	C
Military Industry	Weapon	C	C
	Warship building	C	C

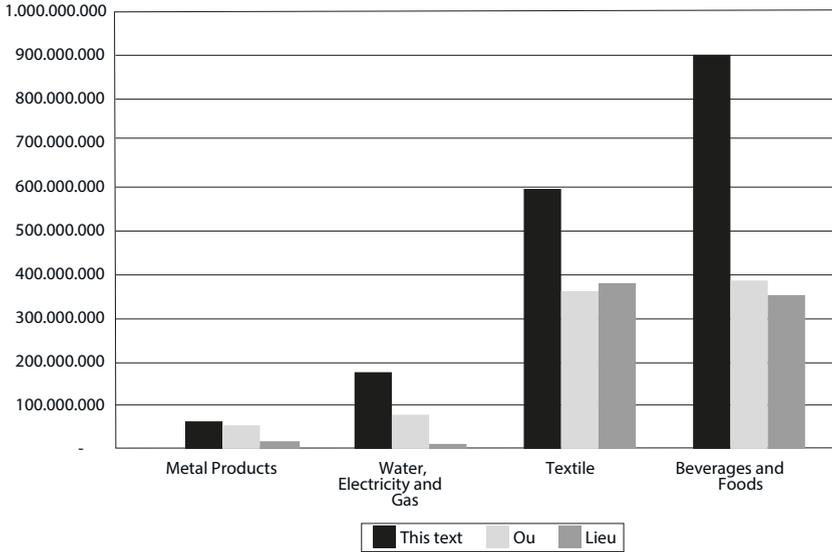
'C' refers to data offered by this text on county level, 'P' refers to data offered by this text on provincial level, A dash (-) refers to subsectors offered by Ou on either county or provincial level. With exception of both sectors of water, electricity & gas as well as military, other sectors with county level data cover modern and handcraft.

Results

When comparing our results with Lieu and Ou (see Figure 1), it appears that our dataset is substantially more complete than the earlier attempts. This difference is especially marked in the beverages and food sector which has a high share of handicraft workers as can be observed in Figure 1. Figures 2 and 3 presents the distinction between handicraft and modern manufacturing industry on the provincial level, expressed in 1933 prices, for Jiangsu and Guangdong respectively.

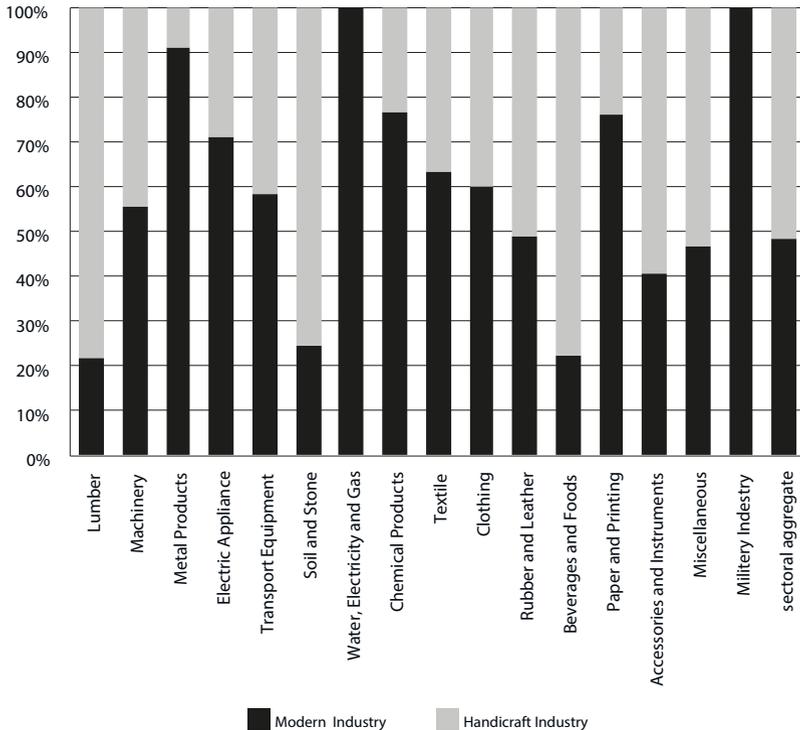
For the different regional patterns in Jiangsu and Guangdong in Figures 2 and 3, one could find the following explanations. First, although Jiangsu and Guangdong were the earliest industrializers in China (starting already in the 1860s), there was a substantial gap between both provinces in the 1930s. Not only was the number of modern factories in Jiangsu seven times higher than that in Guangdong, the share of output value of modern factories in total manufacturing industry was also two times higher than that in Guangdong. Second, Jiangsu and Guangdong also present two phases of early industrialization in 1930 China. Industrialization in Guangdong had developed from the production of resource-intensive primary commodities. Hence, the production of food processing commodities such as rice, sugar, oil, and tea accounted for the biggest share of total manufacturing industry.

Figure 1 Comparison of aggregate gross output value of total (modern and hand-craft) industry, in selected sectors by Lieu, Ou and our dataset for Jiangsu and Guangdong (unit: Chinese yuan)

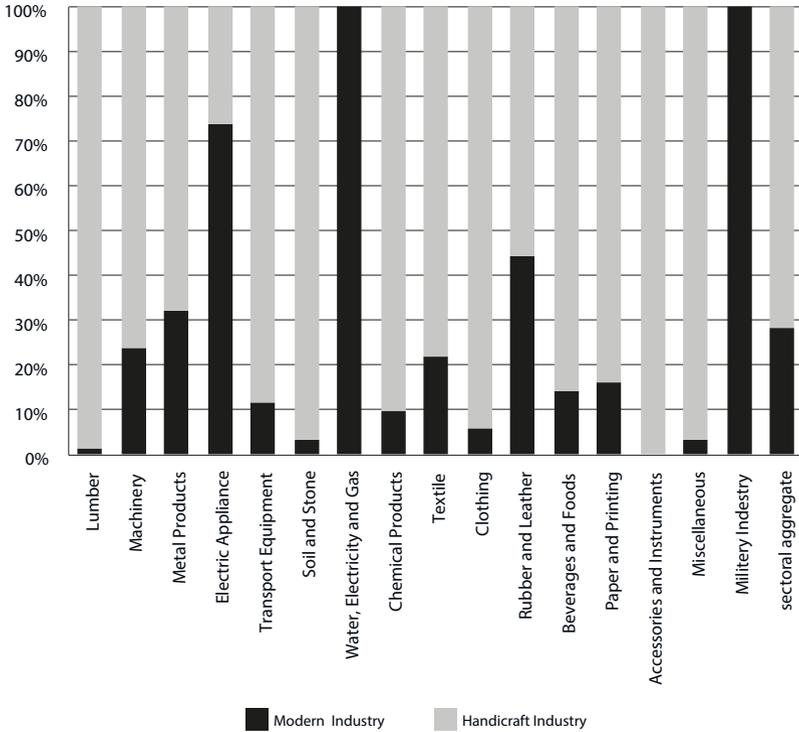


Sources: D.K. Lieu (1937); Ou Pan-San(1947); this text.

Figure 2 Share of modern and handcraft industry by sector in 1933 price in Jiangsu



Sources: this text.

Figure 3. Share of modern and handicraft industry by sector in 1933 price in Guangdong

Sources: *this text*.

Meanwhile, according to some historical records, industrialization in Jiangsu had already achieved a shift from this resource-intensive to a labour-intensive pattern between 1920 and 1930. This was mainly driven by increasing textile and clothing sectors. Unfortunately, the Great Economic Depression that occurred between 1929-1933 resulted in a relative decline in both textile and clothing sectors in Jiangsu and forced it to return to resource intensive sectors such as food production (i.e. flour and tobacco sectors). As a result, the production in labour-intensive sectors such as textiles and clothing only accounted for around 30% of total manufacture industry and food production was one of the biggest sectors with a share of around 40% of the total manufacturing industry. Finally, our study of both provinces shows already major differences on a regional level. This is likely to be true as well for other provinces.

Conclusion

Regional industrialization has become a hotly debated topic in recent years. Yet, oddly enough, regional developments in China, one of the fastest industrializing countries in the world, are largely neglected. In this paper, we not only list existing studies but also try to complement them with a variety of additional sources. This has resulted in new, and substantially higher, estimates of industrial output value both on provincial and county level in Jiangsu (including Shanghai) and Guangdong. We thus hope that the method of this study may be applied to other Chinese provinces as well and that this study may contribute to further research in economic history, economics, and economic geography.

About the authors

Yi Xu (1979) is a Professor in Chinese History in Guangxi Normal University in China, and a PhD researcher at the International Institute of Social History in Amsterdam. His main research interest is quantitative economic history of China, including studies of historical national accounting, urbanization, human capital, and industrialization. He has published 16 Chinese papers in Chinese academic journals, and 3 papers in English academic journals and volume. Currently he is involved in the writing of an English volume on regional industrialization in China in 1933, cooperating with Dr. Bas van Leeuwen (International Institute of Social History).

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