

Urban Wholesale Price Change and Economic Growth in Modern China

YURU WANG*

(Institute of Economics, Nankai University)

Abstract:

It is well known that the motion of prices is the core of the market mechanism, and that it works as a signal of the national economic development. This paper uses wholesale price materials of three cities (Tianjin, Shanghai and Guangzhou) from 1910s to 1940s, and classifies them according to their purpose for production and consumption. On this base, the paper calculates the urban wholesale price index by weighted average method. Furthermore, it gives an analysis to the wholesale price changing trend and its influence on the economic growth of modern China.

I. Problem Posing

Price motion is the core of the market mechanism. One of the most important aspects of researching one country or area's economic development is to review its price level. The author's doctoral dissertation in 1994, whose title is relative price motion and modern China's economic development, is about the price motion of modern China. In the doctoral dissertation, the author used wholesale price index which was formulated by Qiyu Tang and Wetmore as the general wholesale price index of China to analyze its general price motion. However, both of the indices were formulated by using foreign trade price data instead of China's real wholesale price data. The author has ever tried reformulating a national wholesale price index by using the wholesale price index of Shanghai, Tianjin and Guangzhou. Unluckily, the author, due to the money and time limit, could not find the original data on which Guangzhou's wholesale price index was based. Then, formulating a new wholesale price index which is based on modern China's market price has become a critical task of the author. Before finishing the research in Economic Institute of Hitotsubashi University in Sep., 1998, the author was invited to participate in a key research project granted by Japanese Ministry of Education which was about "Asian historical statistics".

* Yuru Wang, professor of economic history in Nankai Institute of Economics, and director of economic history research center of Nankai University. When I finished my research work as a visiting scholar in Institute of Economic Research of Hitotsubashi University in October 1998, I was honored to be invited as a joint-member working on the COE project of "Asian Historical Statistics", granted by Japanese Ministry of Education. My research work is the prices statistics of Pre-war China. This paper is part of the project. I would like to thank Doctor Zhao Chen for his help on data entry and calculation. I would also like to express my heartfelt gratitude to Doctor Jing Cao for her translation. Needless to say that I alone am responsible for the ideas expressed here.

This opportunity helped the author to share plenty of information and made it possible to reformulate modern China's wholesale price index. This paper is a preliminary achievement and needs a further improvement. The author welcomes kinds of comments and suggestions.

II. Review of Formulation History of Modern China's Price Index

The formulation of price index of old China began from the end of 19th century. It could be divided into three stages: the first stage which was from 1805 to 1919 was the stage when foreigners formulated China's price index. The price index was first published in Commission's report of 1894-1895 in 1895. It was China's wholesale price index of 1873-1892 which was formulated by W.C. Wetmore. Japanese Money Commission also formulated China's wholesale price index of 1874-1893 but its data sources were unknown. The second stage which started from 1919 was the beginning stage when Chinese people formulated China's price index. In order to amend tariff tax regulations, ministry of finance established price survey office in Shanghai to investigate the price changes of import or export goods. These became the data source of Shanghai price index. Meanwhile, Professor J.L. Buck of Nanking University asked his students to collect 8 or 9 kinds of prices in Yanshan of Hebei province and Wuxiang of Shanxi province. Based on these data, he formulated the price index and published it in Publication of the American Statistical Association. The third stage which was after 1926 was the stage when the formulation of China's price index was well developing. All of the government departments, research institutes, universities and scholars were formulating price index. What we can find now are mostly the achievements of that period including wholesale price index formulated by Doctor Tang Qiyu, wholesale price index, retail price index and living expense index of part of cities formulated by kinds of research institutes and persons, import and export price index, foreign exchange index and so on.¹

The urban wholesale price indices after the 1920s which the author has so far found are Tianjin (1913-1947), Guangzhou (1912-1937), Shanghai (1921-1944), Nanjing (1930-1937) Qingdao (1930-1937), Hankou (1930-1932), Liaoning (1930-1932), Chongqing (1937-1944) and wholesale and retail price data of 1930-1936 in *Survey Data Compilation of the Price Parities between*

¹ Feng Huanian, Indices of China, *Economic Statistics Quarterly*, No.4, Vol.1, Dec. 1932.

Industrial and Agricultural Products which was compiled by survey office of price parities between industrial and agricultural products of various provinces after liberation. Among all the price indices, what are widely used are Tianjin (North China) wholesale price index (1913-1936 and 1938-1942) which was formulated by Nankai Institute of Economics, Shanghai price index (1926-1948) which was formulated by ministry of finance Shanghai price survey bureau, Guangzhou wholesale price index (1912-1925) which was formulated by Guangdong provincial department of agriculture and industry and Guangzhou wholesale price index (1926-1934) which was formulated by economy survey office of National Sun Yat-sen University. All of these indices were formulated by simple geometric average or simple arithmetic average method. We are lucky enough to find the original data sources of formulating the three urban wholesale price indices. Although the original data has kinds of problems because of the difference in acquisition time, collection channel and statistical caliber, they provide exercisable data for our reformulating price index. Based on those data we can find, the author reformulating modern China's urban wholesale price index.

III. Formulation of Modern China's Urban Wholesale Price Index

When formulating urban wholesale price index in this paper, the author chooses those data of Tianjin (north China), Shanghai and Guangzhou which have long time series and original statistical sources. Weighted average method is used to calculate three cities' and national wholesale price index of production consumption and living consumption. On the basis of these results, the author calculates national urban wholesale price index. The following are some details.

1. Data Selection

When formulating wholesale price index of Tianjin, the author selects data from *Data Compilation of Nankai Economic Index*. These data were formulated by economic research committee of Nankai University. Compared with other data, these data which are from 1913 to 1942 have the longest time series. Except 1937, the classification of statistical commodity in other years is coherent, so these data have highest reliability. Price statistics in Guangzhou and Shanghai has the problem of conflicting classification in different stages. Shanghai's price data of 1925-1944 are selected from *Shanghai Price Quarterly Journal* published by the national tariff commission. The

price data after 1942 are not adopted because the currency system in war period was changed and inflation was serious. Shanghai's price data are not completely from market wholesale price and some of them come from import and export price. Therefore, their reliability is not as high as Tianjin's. Guangzhou's wholesale price of 1912-1925 is selected from *Statistical Compilation Journal* compiled by department of industry and agriculture of Guangdong government. Guangdong's wholesale price of 1926-1934 uses the data from a series of book of economic survey office of National Sun Yat-sen University. Guangdong's wholesale price of 1935-1936 uses the data from *Survey Data Compilation of the Price Parities between Industrial and Agricultural Products* compiled by survey and research office of industrial and agricultural commodity of Guangdong province.

2. Weight and Base Period Selection

The compilation of price index before liberation usually adopted simple arithmetic average or simple geometric average method. The author, in this paper, uses weighted average method. According to economic and statistical theories, the ideal weight is the output of kinds of commodities and second one is the output value. However, as it is known, we cannot find continuous statistical data about national economic accounting in China's history. What we can find now is the statistics of national income in the 1930s. Based on collection on industrial census in 1933, Wu Baosan and Liu Dazhong and Ye Kongjia carried on two kinds of calculation. Since personal income tax was not been levied at that time, all the data about wages, rent, profit and interest didn't exist. Hence, only added value method could be used to calculate GNP. That method added net output value and service value of all the economic departments and used production price to calculate. Although Wu and Liu used the same method, their results were different. Wu estimated that GNP in 1933 was 19.95 billion yuan and its correction value is 20.32 billion yuan. Liu and Ye estimated that GNP in 1933 was 29.88 billion yuan. The great difference attributed to the estimation difference of agricultural net value which took more than 60 percent of GNP. And this estimation difference was caused by the estimation difference of rice output in China. This is a controversial issue.² On this issue, the author is inclined to Wu's estimation. In this paper, when calculating modern China's urban wholesale price index, the author classifies all

² Wu Chengming, The Story of Chinese CNP, *Economist teahouse* No.4, 2002.

the commodities into production commodities which are used for production consumption and consumption commodities which are used for living consumption. There are altogether 23 kinds. Please see the following table.

Table 1. Gross Output Value of Manufacturing Industry of China, 1933

(Thousand yuan of 1933)

Sectors	Value of Production	Sectors	Value of Production
Production goods		Consumer goods	
Lumber	134 748.2	Wood product	82 723.2
Machinery industry (including transport vehicle)	178 024	Metal product	22 756
Metal and metal product	48 799	Decorations instrument	24 156
Water & electricity	250 808	Earth stone, ceramic article	26 037
Earth stone, ceramic & glass products	101 696	Chemical	113 196
Chemical	56 815	Textile	838 362
Textile	1 403 129	Clothing manufacture	231 270
Leather	47 389	Leather rubber products	151 891
Papermaking & printing	145 817	Foods	2 799 017
Metallic currency manufacture	41 034	Tobacco & liquor drink	1 020 282
Minerals	367 439	Papermaking industry	41 300
		Miscellaneous goods manufacture	53 785

Source: The data are based on Wu Baosan, Revision of "National Income of China, 1933", *Quarterly Review of Social Sciences*, Vol. IX, No.2, PP. 141-142. The percentage of product and consumer goods are based on Liu Ta-chung and Yeh Kung-chia, *The Economy of the Chinese Mainland: National Income and Economic Development, 1933-1959*, Princeton, New Jersey, Princeton University Press, 1965.

Most of the price indices take 1913 or 1926 as the basic period because their data sources begin from that year. In this way, Shanghai's data source began in 1925, so 1913 shouldn't be regarded as its basic period. The year of 1926 shouldn't be regarded as the basic period either because China was experiencing the First Chinese Revolutionary Civil War and economic development was seriously affected. In 1927, national government was founded and Chinese economy was stepping into normal conditions. In addition, because China adopted silver standard system at that time, the great depression in 1929 had buffer effect on China. China didn't have market crisis until 1933 and the impact of the crisis on Chinese economy was smaller than that on western countries. Based on the above causes, we select 1930 as the basic period of formulating China's urban price index.

3. Calculation Method

Simple geometric average method is used to calculate the prices of different kinds of commodities.

Weighted average method is used to formulate the price index based on 1930.

Suppose there are n kinds of commodities and their prices are $P_1, P_2, P_3, \dots, P_n$.

The formula of simple geometric average method is like $P = \sqrt[n]{P_1 * P_2 * P_3 * \dots * P_n}$

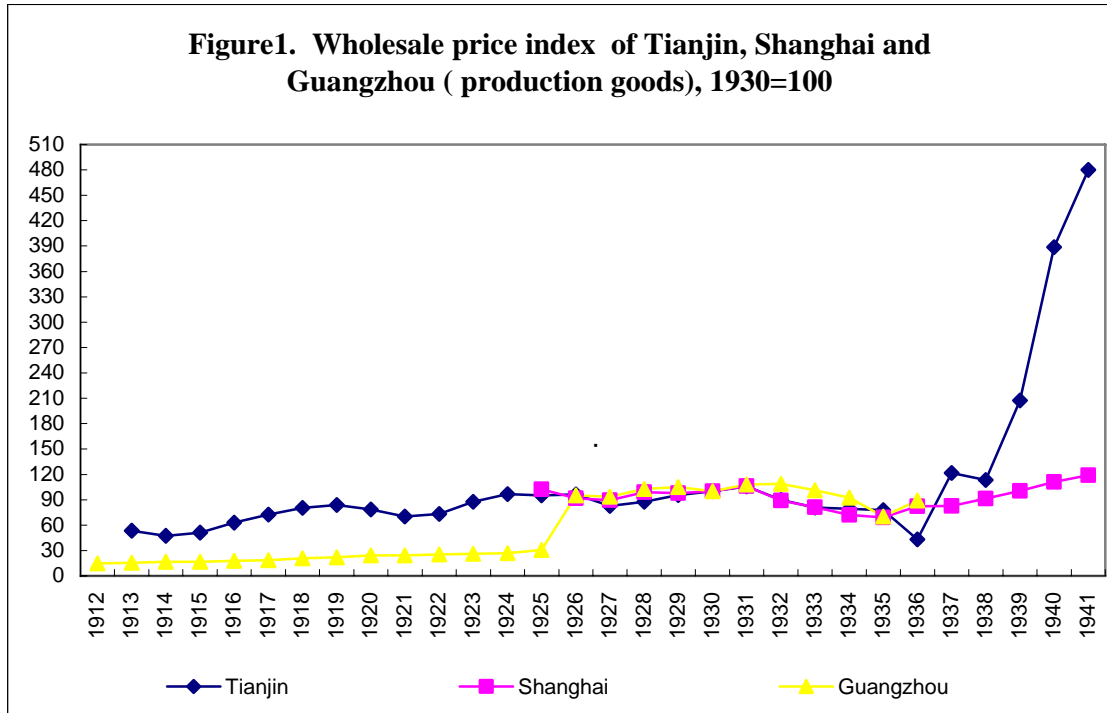
and the formula of weighted average method is like $P_{t/0} = \frac{\sum P_t q_{1930}}{\sum P_0 q_{1930}}$

The price indices of Tianjin, Shanghai and Guangzhou which are formulated by the above formula are as follows:

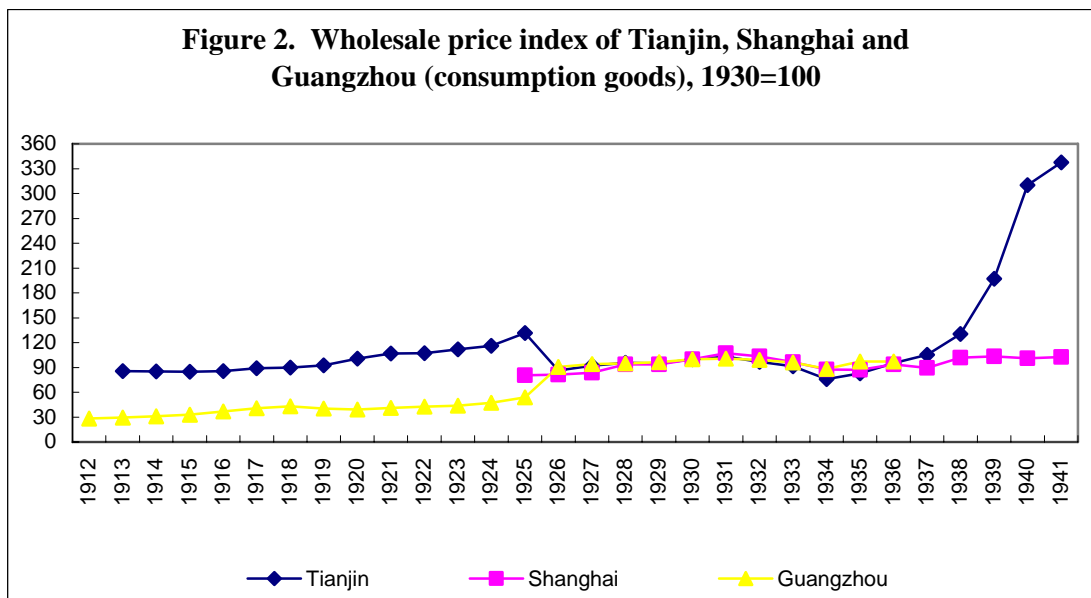
Table 2. Wholesale Price Index of Tianjin, Shanghai and Guangzhou (1930=100)

Years	Tianjin		Shanghai		Guangzhou	
	Production goods	Consumption goods	Production goods	Consumption goods	Production goods	Consumption goods
1912					14.72	28.31
1913	53.61	85.38			15.40	29.27
1914	47.56	85.11			16.62	30.89
1915	51.15	84.65			16.84	32.91
1916	62.86	85.39			17.79	36.70
1917	72.38	88.88			18.57	40.69
1918	80.31	89.73			20.75	43.06
1919	83.87	92.44			21.88	40.19
1920	78.41	100.74			24.09	39.14
1921	70.01	107.03			24.24	41.07
1922	73.07	107.34			25.24	42.39
1923	87.48	111.87			26.14	43.72
1924	96.53	116.27			26.77	47.36
1925	95.29	131.52	102.51	80.42	30.67	53.72
1926	96.39	86.39	91.95	81.23	95.28	90.66
1927	82.72	92.30	89.43	83.79	93.57	94.08
1928	87.52	95.58	99.07	93.50	102.60	94.93
1929	95.64	94.97	97.94	93.54	105.16	96.58
1930	100.00	100.00	100.00	100.00	100.00	100.00
1931	105.82	102.92	106.22	107.07	107.95	100.55
1932	89.89	96.80	89.23	103.49	108.95	99.01
1933	80.81	91.51	81.30	96.45	101.25	96.05
1934	79.28	75.97	72.13	87.61	92.42	88.44
1935	77.66	83.00	69.19	87.18	70.28	97.28
1936	43.22	95.31	82.19	93.82	89.09	97.08
1937	121.74	105.45	82.51	89.39		
1938	113.19	130.48	91.39	101.94		
1939	207.33	196.96	100.30	103.44		
1940	388.66	310.08	111.09	100.91		
1941	479.95	337.45	119.21	102.43		
1942	517.52	458.82	1895.52	2560.63		

1943			8030.89	7667.41		
1944			49531.82	43689.79		
1945			36840045.00	6523986.00		
1946			1407508.00	627062.80		
1947			14140968.00	6152000.00		
1948			9.26E+09	3.91E+09		



Source: Based on the data of Table 2.



Source: Based on the data of Table 2.

Because we only have the price data of the above three cities, weight selection is quite important

for us when we formulate urban price index of the whole country. Neither Wu nor Liu and Ye have regional GNP data, so we cannot take output value as the weight. Except remote areas, commodity circulation of modern China mainly depends on water system. In view of this characteristics and findable data, we take population as the weight. According to Tao Menghe and Wang Shida's estimation, the population of China from 1928 to 1935 is 438.407927 million among which 368.747096 million live in yellow river basin, yangtze river basin and pearl river basin. We take the population of yellow river basin, yangtze river basin and pearl river basin as the weight to formulate national wholesale price index by weighted averaging urban wholesale prices of Tianjin, Shanghai and Guangzhou. The results are as Table 3 and Figure 3.

Table 3. Weight of Urban Wholesale Price of Modern China

Areas	Population	Areas	Population	Areas	Population
Yangtze valley:	195554469	Yellow River valley:	118465638	Pearl River valley:	54726989
Jiangsu	31455565	Hebei	26740391	Guangdong	31406057
Zhejiang	20208429	Henan	32623930	Guangxi	13385215
Anhui	22020591	Shandong	34623930	Fujian	9741794
Jiangxi	15724412	Shanxi	10881690	Shantou	193923
Hunan	28335031	Shanxi	10112230		
Hubei	26551264	Qingdao	524415		
Sichuan	46823665	Tianjin	1209696		
Shanghai	3703430	Beijing	1561027		
Nanjing	732082	Xian	188329		
Percentage (%)	53.03%		32.13%		14.84%

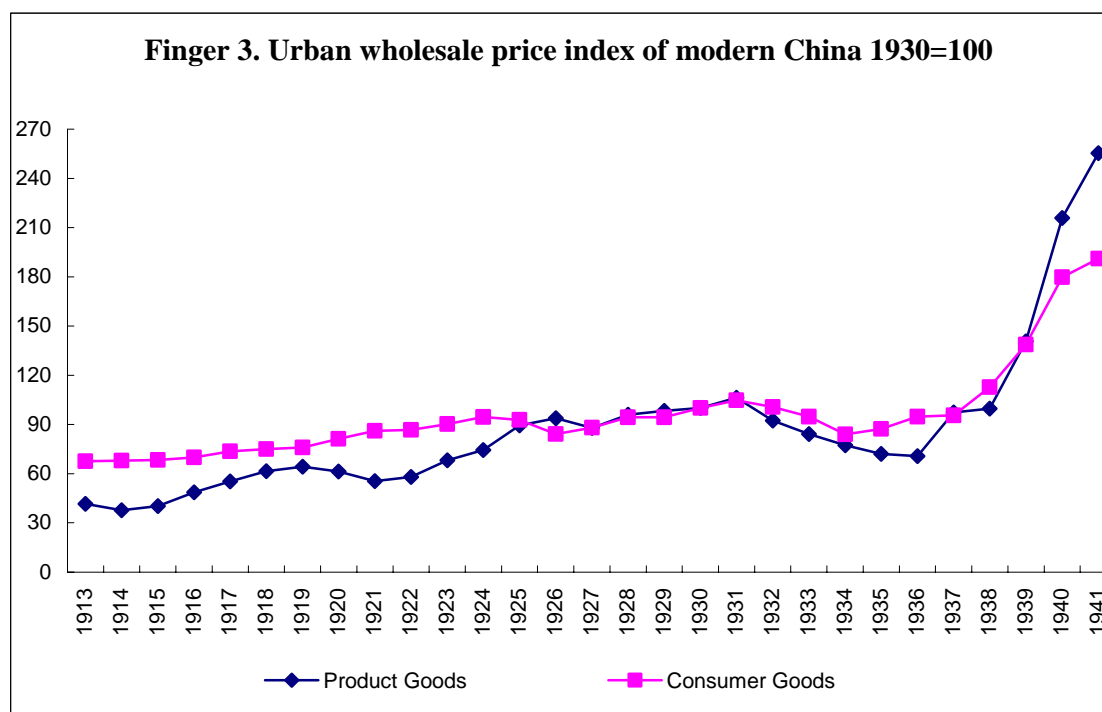
Sources: Tao Meng-Ho and Wang Shih-Ta, *Statistic of Chinese Population*, taken from the 17th to the 24th year of the republic, 1928-1935, *The Chinese Year Book*, 1936-37 Second Issue, pp.104-107. The Commercial Press, Ltd, Shanghai, China.

Anti-Japanese war broke out in China in 1937. After that, China's economic development was badly damaged and inflation became more and more severe. In the mid-period of the war, currency was overissued. There was not official uniform currency parity for each year. Therefore, we select those weights before 1941 to formulate China's urban wholesale price index.

Table 4. Urban Wholesale Price of Modern China (1930=100)

Years	Production Goods	Consumption Goods
1913	41.54	67.65
1914	37.78	67.98
1915	40.31	68.30

1916	48.62	70.01
1917	55.38	73.65
1918	61.49	74.98
1919	64.29	75.93
1920	61.25	81.27
1921	55.55	86.19
1922	57.96	86.82
1923	68.10	90.34
1924	74.49	94.50
1925	89.53	92.88
1926	93.87	84.28
1927	87.89	88.05
1928	95.89	94.38
1929	98.27	94.45
1930	100.00	100.00
1931	106.35	104.77
1932	92.37	100.68
1933	84.11	94.80
1934	77.44	83.99
1935	72.07	87.33
1936	70.69	94.78
1937	97.31	95.45
1938	99.61	112.71
1939	140.68	138.72
1940	215.81	179.82
1941	255.31	191.10



Source: Based on the data of Table 4.

IV. Changes of Urban Wholesale Price and Economic Growth

Through Table 4 and Figure 3, we know something about the trend of modern China's urban price.

The aim of our formulating price index is to analyze economic conditions of various periods.

First of all, we can see from Table 4 and Figure 2 that there is a great difference between Tianjin's and Guangzhou's price levels from 1913 to 1925. From 1926 to anti-Japanese war, there is nearly no difference between wholesale price levels of Tianjin, Shanghai and Guangzhou. This reflects the growth conditions of modern China's market. Before 1927, China was in the situation of turbulence and separatist warlord regimes, which made the society in the chaos caused by war for a long time. After the foundation of Nanjing national government in 1927, the economic development of China had institutional guarantee. In addition, the development of transportation industry including railway and highway facilitated price transmission and lowered transaction costs. This provided conditions for the formation of national uniform market. According to statistics, 3.42238 thousand kilometers of railway was built from 1912 to 1927 and average annual mileage was 2.1389 hundred kilometers. In contrast, 7.99566 thousand kilometers of railway was built from 1928 to 1937 and average annual mileage was 7.996 hundred kilometers, among which average annual mileage was 1.13288 thousand kilometers from 1932 to 1937.³ Freight transportation of national railway increased from 242.224 thousand tons during 1912 to 1926 to 438.987 thousand tons during 1927-1936.⁴ As another kind of new transport facility, highway got rapid development. 3.71923 thousand kilometers of highway was built from 1912 to 1927 and average annual mileage was 2.5 hundred kilometers. Before anti-Japanese war, the newly built highway reached 88.126 thousand kilometers and average annual mileage was 8.812 thousand kilometers.⁵ In that period, domestic produced volume of commodity circulation was 930 million yuan in 1913 and 1490 million yuan in 1920 and 2464 million yuan in 1930.⁶ However, what we should not neglect was that there still were problems of inconvenient transportation, market dispersion, regional price differentials and seasonal price differentials in rural areas, especially in

³ Yan Zhongping, *Collection of Chinese Modern Economic History Statistics Materials*, Science Press, Beijing 1954. p180

⁴ Hao Renping, *An Calculation on Rail way Statistic and Railway Income in Pre-war China: Study on the State Railway*, Discussion Paper No.D99-28 of COE Project Funded by Japan Government: *Asian History Statistic*, Institute of Economic Research of Hiotsubshi University, Tokyo, 2000

⁵ The edition committee of highway traffic history, *Chinese highway history*, People's transportation press 1990.

⁶ Edited by Xu Dixin, Wu Chengming, *Development History of China*, Vol.2 and 3, People's Press, 1990, 1993.

remote areas.⁷ In all, a uniform market was not formed at that time.

Table 5. Production Indices of Selected Industrial Sectors in China

1933 net value of product =100

Years	Consumption Goods	Coal	Black metal	Other minerals	Electric power
1912	8.3	23.5	4.7	84.7	2.5
1913	12.1	25.9	29.3	85.0	3.3
1914	16.2	36.3	37.2	90.2	3.7
1915	19.2	38.6	41.9	89.4	4.6
1916	20.7	43.2	46.1	85.4	5.2
1917	22.4	47.7	44.5	110.9	5.9
1918	24.0	50.6	49.3	98.5	6.8
1919	32.9	58.2	60.3	81.0	7.2
1920	39.5	64.3	70.2	98.9	7.8
1921	44.9	60.7	62.9	66.8	11.4
1922	30.6	64.0	51.3	85.8	14.1
1923	38.5	77.2	48.7	74.1	21.3
1924	44.5	84.2	51.9	66.4	27.7
1925	53.6	79.8	48.7	142.0	34.0
1926	59.6	71.1	53.4	128.5	36.2
1927	69.7	80.5	59.7	111.7	37.2
1928	76.3	81.8	69.7	98.9	42.5
1929	80.9	85.8	76.5	96.0	49.0
1930	58.3	90.5	81.7	96.4	53.6
1931	91.7	95.9	78.6	106.9	62.0
1932	93.7	91.9	89.1	85.0	86.3
1933	100.0	100.0	100.0	100.0	100.0
1934	98.1	117.4	114.8	103.7	111.6
1935	93.5	136.9	187.1	129.2	128.0
1936	99.5	153.8	227.7	157.7	148.3
1937	68.6	142.7	283.0	173.0	89.9
1938	31.4	130.8	289.2	196.7	112.3
1939	37.6	157.8	323.8	198.9	113.6
1940	38.9	201.8	368.4	117.0	160.7
1941	32.0	252.2	438.1	186.9	187.6

Sources: John K Chang, *Industrial Development in Pre-Communist China*, Edinburgh University Press, 1969, P78.

Second, we can see from Table 4 and Figure 3 that Chinese wholesale price rose slowly with fluctuation. The production commodities fluctuate more than consumption commodities. This result is consistent with the economic development of modern China. Lack of continuous statistic data of GNP, we use the changes of production index to compare with the changes of prices. In this way, we can show the relationship between economic growth and price changes. Figure 4 reveals that, except selected mineral products, 4 kinds of production index including consumption production have similar trend and range before 1937. Figure 5 is about the changing trend of

⁷ Yuru Wang, *A Study on the Price Mechanism of Modern China*, Shangxi Peoples Press, 1997. see Chapter 3.

wholesale price index and production index. Generally speaking, the changing trend of wholesale prices which rises with fluctuation is consistent with that of production index of industrial departments. This result is consistent with the author's conclusion that departments of modern China grew rapidly in more than 30 years of the early half of the 20th century and the average annual growth rate reached 7.91% during 1914 to 1936. However, due to its percentage in national economy is small (6.3% in 1936), annual growth rate of nation economy was 1.45%.⁸ Therefore, Chinese modernization of economy was not realized before 1936.

Figure 4. Production Indices of Selected Industrial Sectors in China (1933=100)

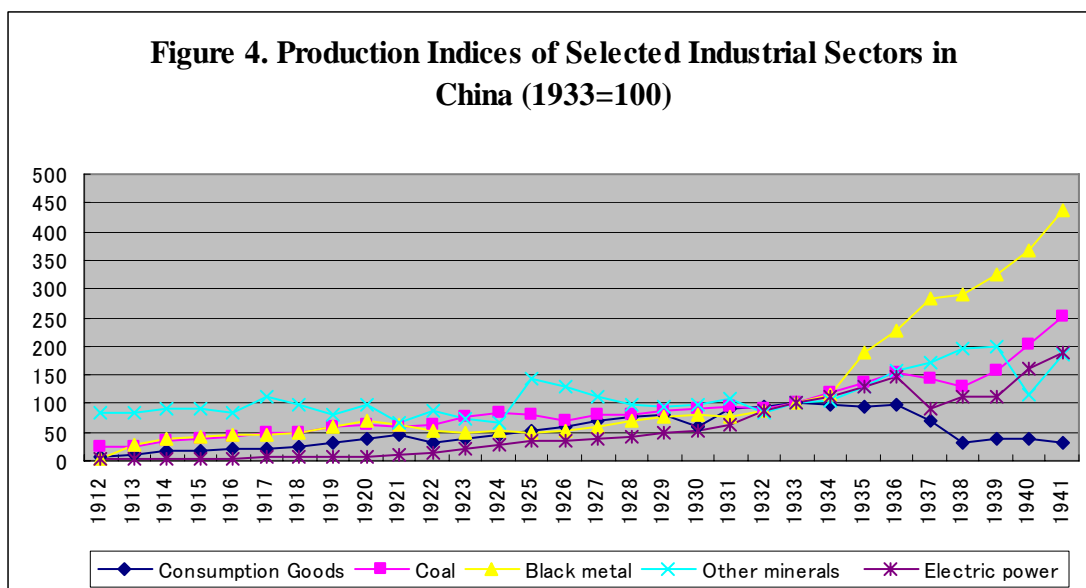
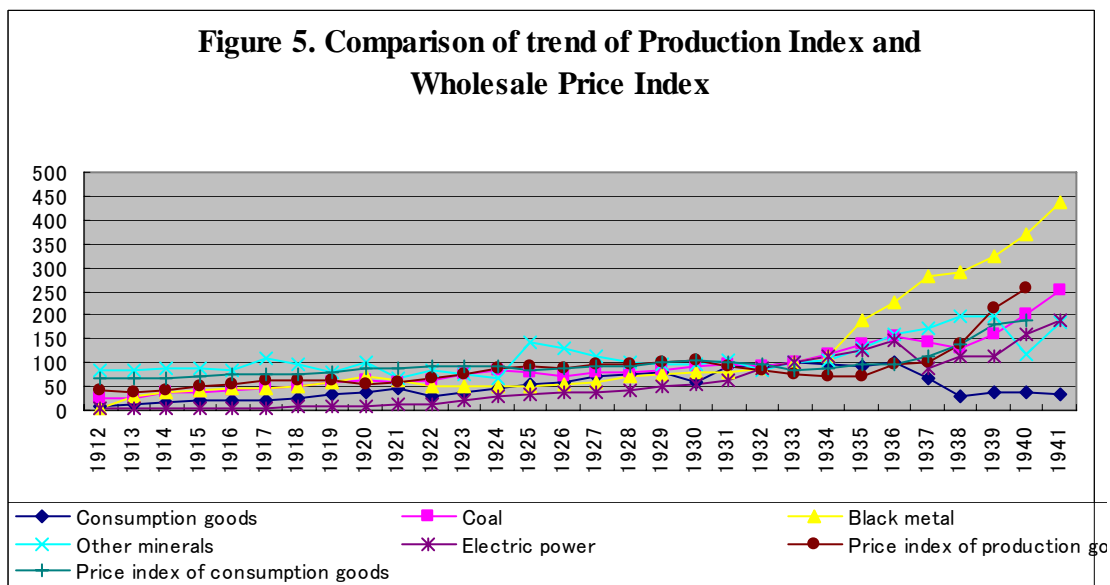


Figure 5. Comparison of trend of Production Index and Wholesale Price Index



⁸ Foding Liu, Yuru Wang & Jianwei Yu, *Economic Development in Modern China*, Shandong People's Press, 1997. p187

Bibliography:

1. Feng Huanian, Indexes of China, *Economic Statistics Quarterly*, No.4, Vol.1, Dec. 1932.
2. Wu Chengming, The Story of Chinese CNP, *Economist teahouse* No.4, 2002.
3. Edited by Xu Dixin, Wu Chengming, Development History of China, Vol.2 and 3, People's Press, 1990, 1993.
4. Wu Bao-San, Revision of "National Income of China, 1933", *Quarterly Review of Social Sciences*, Vol. IX, No.2, Published by The Commercial Press, Ltd., Shanghai for the Institute of Social Sciences Academic Sinica, December, 1947.
5. Liu Ta-chung and Yeh Kung-chia, *The Economy of the Chinese Mainland: National Income and Economic Development, 1933-1959*, Princeton, New Jersey, Princeton University Press, 1965.
6. Foding Liu, Yuru Wang & Jianwei Yu, *Economic Development in Modern China*, Shandong People's Press, 1997.
7. Yuru Wang, *A Study on the Price Mechanism of Modern China*, Shangxi Peoples Press, 1997.
8. John K Chang, *Industrial Development in Pre-Communist China*, Edinburgh University Press, 1969.
9. The edition committee of highway traffic history, *Chinese highway history*, People's transportation press 1990.
10. Yan Zhongping, *Collection of Chinese Modern Economic History Statistics Materials*, Science Press, Beijing 1954.
11. Hao Renping, *An Calculation on Rail way Statistic and Railway Income in Pre-war China: Study on the State Railway*, Discussion Paper No.D99-28 of COE Project Funded by Japan Government: *Asian History Statistic*, Institute of Economic Research of Hiotsubshi University, Tokyo, 2000