民國二十四年

南開指數年刊

(包括批發物價生活費國外匯兌及國外貿易指數)

NANKAI INDEX NUMBERS, 1935

(Of commodity-prices at wholesale, cost of living, foreign exchange rates, and quantities and prices of imports and exports)

天津南開大學經濟研究所

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引　言

十九世紀末僑居上海之英人溫德慕氏（W.C. Wetmore）所編製之二十種重要商品價格指數（時期 1873-1892 年），實爲我國物價指數之濫觴。日本幣制調查委員會（Japanese Monetary Commission）亦曾有 1874-1893 年五十二種商品價格指數之編製。嗣後二十餘年間，吾國指數之編製，雲煙消沉，繼起無人，直至歐戰爆發，國內物價飛騰，物價指數，遂復爲國人所注意。1919 年上海調查貨價局（即今之財政部國定稅則委員會），發表上海批發物價每月指數，1924 年廣東農工廳發表廣州批發物價每月指數，其他繼起者如雨後春筍，盛極一時。以數量論，前後共達六十六種之多（其中已停止編製者計三十一種，現繼續編製者計三十五種）；以範圍論，自批發物價，零售物價，進而擴充至生活費，工資，外匯，股票及債票；以發表期限論，由按月發表，進而至按週與按日發表；以編製之公式論，由簡單算術平均，進而採用幾何平均，總合平均，及「理想」公式矣。[1]

本所鑑於國內之需要，年來對指數之編製，黽勉前進，未敢後人。所編製之各種指數，悉按期在國內各重要報章雜誌及本所出版之「南開統計週報」——後改爲「中國經濟月報」（Monthly Bulletin on Economic China）——及「經濟統計季刊」發表。今者「經濟統計季刊」改爲「政治經濟學報」；「中國經濟月報」改爲「南

1. 詳情請參閱何廉：Price and Price Indexes in China, Chinese Economic Journal, Vol.I,No.6, pp.1-25, June, 1927. 馮華年：中國之指數，經濟統計季刊一卷四期，661-717頁，1932 年十二月。

開社會經濟季刊」(Nankai Social and Economic Quarterly),刊物之性質既易,指數附錄,不得不付諸闕如。故自二十三年起,將本所編製之一切指數,除按期仍在國內各重要報章雜誌發表外,按年彙編,刊行「南開指數年刊」。茲爲便利讀者起見,爰將各種指數之性質及其編製方法,撮要述之於下:

I

華北批發物價指數[2]

華北每週批發物價指數,發表於 1928 年四月。但每年指數係始自 1913 年,月指數則自 1928 年一月起。每週指數於每星期日及星期一發表,以上星期三爲計算截止日。物價資料係本所特派調查員自華北各主要市場每日調查而得。指數編製方法,採簡單幾何公式,以 1926 年全年平均爲基數。包含商品計一百零六種。本指數分爲按工業性質及加工程度兩大類。各類指數包含之商品項數與比重列如下表:

甲・按工業性質分類

	項目	比重
1. 食物	43	40.57
2. 服用品	19	17.92
3. 金屬品	15	14.15
4. 建築材料	12	11.32
5. 燃料	12	11.32
6. 雜項	5	4.72
	106	100.00

2. 詳情請參看何廉: The Nankai Weekly Index Number of Commodity-prices at Wholesale in North China, Chinese Economic Journal, Vol. II, No.5, pp.411—417, May, 1928.

乙• 按加工程度分類

	項目	比重
1. 原料品	41	38.68
農產品	21	19.81
動物產品	7	6.61
林產品	4	3.77
鑛產品	9	8.49
2. 製造品	65	61.32
生產品	26	24.53
消費品	39	36.79
	106	100.00

II

天津工人生活費指數[3]

天津每週工人生活費指數發表於1930年六月。惟年指數與月指數始自1926年正月。每週指數每星期日及星期一發表,以上星期三作爲計算截止日。物價資料係由本所特派調查員赴天津各勞工家庭集居處調查而得。指數編製公式爲加權總合法,所用權數係根據1927年九月至1928年六月間所舉行之天津手藝工人家計調查,所估計而得之平均每家每年對於各項物品之消費量。以1926年全年平均爲基數,包含商品凡三十七項,茲將項目之分類及1926年與1934年比重之變更,列表如下:

項目		比重	
		1926	1934
食物	25	64.22	59.53
服用品	6	6.21	5.96
燃料與水	5	14.11	15.82
房租	1	15.46	18.69
	37	100.00	100.00

3. 詳情請參看何廉吳大業:天津每週工人生活費指數編製之說明,經濟統計季刊,一卷二期,323—362頁,1932年六月。

III

上海外匯指數[4]

上海每週外匯指數發表於 1930 年。惟年指數與月指數始自 1905 年。每週指數以上星期五作爲計算截止日。包含項目爲上海對英,美,法,日各國之每日電匯率。指數編製公式爲加權總合平均法,以上年度中國對各國直接貿易值爲權數,而以 1930 年全年平均爲基數。此外,本所另編一個外匯指數。此指數係以各國外匯平價爲基數;編製方法先求得英,美,法,日四國滙率對平價的比率;再將各國滙價比率應用加權算術平均法,並用上年度中國對各國直接貿易值爲權數而求得之。

IV

中國進出口貿易物量物價指數[5]

本所發表之對外貿易指數,計分爲兩類。其一以固定時期爲基期而計算進出口物價物量對基年之百分數,名爲「未調節指數」;另一係計第一種指數對已計得之長期趨勢之離差,名爲「調節指數」。指數時期由 1867 年起直迄現在。

未調節指數　計算對外貿易未調節指數,其所包含「直接列入品」之數值,佔全體進口值或出口值之三分之二以上,對於「未能直接列入品」,則用估計方法推求之。估計方法乃先將價格變動過劇之項目予以剔除,再以已估計得之物價的變動除「未直接列入品」之數值,而得「估計的數量」作爲計算指數之用。因進出口商

4. 詳情請閱何廉: An Index Number of the Foreign Exchange Rate, in Chinese Economic Journal, Vol. II, No. 2, pp. 1—40, February, 1928; 吳大業:一個新的外匯指數,政治經濟學報,三卷三期,463—509頁,1934年四月.

5. 詳情請參閱何廉:中國進出口貿易物量指數物價指數與物物交易率指數編製之說明(1867—1930),經濟統計季刊,一卷一期,1932年三月.

品之種類及重要性,年有更易,故採用連鎖基期法。先計算每年對上年之連環指數而後連乘起來成爲連鎖指數,以1913年作爲100%。指數編製公式,係採用費暄氏之「理想」公式,以四種數量組合而成,即ΣP_0Q_0, ΣP_0Q_1, ΣP_1Q_0, ΣP_1Q_1。此四種數量僅須將秩序倒換,即成爲物量與物價指數公式。物價指數之公式爲:

$$\sqrt{\frac{\Sigma P_1Q_1}{\Sigma P_0Q_1}\times\frac{\Sigma P_1Q_0}{\Sigma P_0Q_0}}$$

物量指數之公式爲:

$$\sqrt{\frac{\Sigma Q_1P_1}{\Sigma Q_0P_1}\times\frac{\Sigma Q_1P_0}{\Sigma Q_0P_0}}$$

調節指數　計算調節指數應用數學方法採二次方程拋物曲線爲長期趨勢線。趨勢線決定後,即計算每個進口或出口之物量物價指數對此常態趨勢之百分率,而成進出口之物量物價調節指數。以常態趨勢線爲100%,以視各指數對常態情形之變異狀況。

最後,本刊各種指數之編製,多由吳大業君負責;至本刊之彙編集成,則賴王文鈞君之力獨多,此應特別提及者也。

何　廉

民國二十五年一月

NANKAI INDEX NUMBERS, 1935

Introduction

Although the invention of *Index number* as a device to measure the changes in the level of prices dated back as early as 1738, its compilation in China did not commence until the 'nineties when W. C. Wetmore, a British resident in Shanghai, published his series for prices of twenty staple commodities for the period 1873-1892. Soon after, the Japanese Commission for the Investigation of Monetary Systems compiled another series for fifty-two commodities for the period 1874-1893. Since the publication of these two series, there had been, for over quarter of a century, no evidence of any study on the subject in China. The increase of prices during the Great War, however, gave rise to a renewed interest in the subject, and in 1919 the first monthly index number of commodity-prices at wholesale in Shanghai was published by the former Shanghai Bureau of Markets, now the National Tariff Commission, of the Ministry of Finance. In 1924, the Provincial Bureau of Agriculture and Industry of Kwangtung followed suit in the publication of another monthly index number of wholesale prices in Canton. Since then, interest in the study of prices in China has increased and efforts at the compilation of index numbers have multiplied. Indeed, during the last few years China h a entered an active stage in the making of index numbers. There are altogether thirty-five index numbers published currently in China to-day, in addition to the thirty-one index numbers which are now discontinued. The field covered at first included commodity-prices at wholesale and retail, but is now being extended to cost of living, wages, foreign exchange, stocks, bonds, and foreign trade; the interval of publication was at first mostly by the month, but has been shortened by the week and, in one particular case, by a single day.[1] With the increase in the compilation and promptness of publication there has come also an improvement in the method employed. The early index numbers in China, for instance, were mostly constructed by the simple arithmetic average formula, but to-day not only has the simple arithmetic formula been abandoned and substituted by the aggregative or geometric, but the "ideal" formula has,

1. The Directorate af Statistics of the National Government has recently compiled a daily index number of commodity-prices at wholesale.

in some cases, come into actual use where the requisite data for both quantities and prices are available.[2]

During this active stage of index number making in China, the Nankai Institute of Economics has played a leading part in improving the methods of construction. It compiled the firet weekly index number of commodity-prices at wholesale in North China by the simple geometric average (formula 21) and the first weekly index number of the cost of living in Tientsin by the weighted aggregative method (formula 53), both at a time when the simple arithmetic average predominated in the field of index number making in China. Besides, the Institute has the honor of having been the first to apply the "ideal" formula in compiling the index numbers of the quantities and prices of imports and exports in China. These and other indices which the Institute has compiled have appeared regularly in the leading papers in China as well as in its own periodical publications, the *Nankai Weekly Statistical Service* (in Chinese and English), the *Monthly Bulletin on Economic China* (in English), and *The Quarterly Journal of Economics and Statistics* (in Chinese). With the suspension of the *Service*, the reorganization of the *Bulletion* as a quarterly publication under the new title *Nankai Social and Economic Quarterly*, and the change of the *Quarterly Journal of Economics and Statistics* into the *Quarterly Journal of Economics and Political Science*, the Institute has decided to publish an annual report on *Nankai Index Numbers*, of which the present one is the second number. It may prove useful, therefore, to give at the outset some brief explanations with reference to the character of the index numbers included in the report and the methods of their construction.

I

Index number of commodity-prices at wholesale in North China[3]

The index number of commodity-prices at wholesale in North China is published every Sunday and Monday since April of 1928, but yearly figures have been calculated back to 1913. The weekly index covers the week

2. For a critical study and summary of index number in China, see Franklin L. Ho: Prices and Price Indexes in China, in *Chinese Economic Journal*, Vol. I, No. 6, pp. 1-35, June, 1927; H. N. Feng: Index Numbers in China, in *Quarterly Journal of Economics and Statistics*, Vol. I, No. 4, pp. 661-717, December, 1932.

3. For fuller description, see Franklin L. Ho: The Nankai Weekly Index Number of Commodity-prices at Wholesale in China, in *Chinese Economic Journal*, Vol. II, No. 5, pp. 411-417, May, 1928.

ending the previous Wednesday, as the prices used are the averages of the daily quotations ending Wednesday of the preceding week. These quotations are collected by the field investigators of the Institute from the primary markets in North China. In the absence of full data needed for weighting in China, the formula used in the construction of the index is the simple geometric average, with the year 1926 as base equal to 100%. The number of commodities included in the compilation is 106, and their assortment by industries as well as by stages of production is given as follows:

A. Assortment by industries

	No. of commodities	Assortment
1. Food	43	40.57
2. Cloth and clothing	19	17.92
3. Metals and metal products	15	14.15
4. Building materials	12	11.32
5. Fuel and light	12	11.32
6. Miscellaneous	5	4.72
Total	106	100.00

B. Assortment by stages of production

	No. of commodities		Assortment	
I. Raw materials		41		38.68
Farm products	21		19.81	
Animal products	7		6.61	
Forest products	4		3.77	
Mineral products	9		8.49	
II. Manufactured goods		65		61.32
Producers' Goods	26		24 43	
Consumers' Goods	39		36.79	
Total		106		100.00

II

Index number of cost of living of the working class in Tientsin[4]

The index number of the cost of living of the working class in Tientsin is published every Sunday and Monday since June of 1930, but monthly figures have been calculated back to January, 1926. The weekly index

4. For a fuller explanation, see Franklin L. Ho & Tayeh Wu: An Index Number of the Cost of Living in Tientsin, in *Quarterly Journal of Economics and Statistics*, Vol. I, No. 2, pp. 323-362, June, 1932.

covers the week ending the previous Wednesday, as the prices used are averages of the daily quotations ending Wednesday of the preceding week. These quotations are collected by the field investigators of the Institute from retail stores in or near the living quarters of the factory as well as handicraft laborers in Tientsin. The formula used is the aggregative, which is weighted by quantities of consumption obtained through the Institute's enquiry of family budget of the working class in Tientsin during the period from September 1927 to June 1928. The base period is 1926, and the base number, 100%. The indexnumber includes 37 commodities, the assortment of which for both 1926 (base) and 1934 is given as follows:

	No. of commodities	Assortment	
		1926	*1934*
Food	25	64.22	59.53
Clothing	6	6.21	5.96
Fuel, light and water	5	14.11	15.82
Rent	1	15.46	18.69
Total	37	100.00	100.00

III

Index number of foreign exchange rates in Shanghai[5]

The index number of foreign exchange rates in Shanghai is published every Monday since January of 1930, but monthly figures have been calculated back to 1905. The weekly index covers the week ending the previous Friday, as it includes the averages of the daily T.T. selling rates on London, New York, Paris and Japan ending Friday of the preceding week. The formula used in the construction of the index is the aggregative weighted by the value of China's direct foreign trade of the preceding year, with 1930 as base equal to 100%. In addition, the Institute publishes another monthly series which uses the parity of exchange as the base equal to 100%. In this case, the ratio of the exchange rate on each country to the parity of exchange is first calculated, and a weighted arithmetic average of these ratios is then taken, the weights used being again the value of China's direct foreign trade of the preceding year.

5. For a fuller explanation, see Franklin L. Ho: An Index Number of the Foreign Exchange Rates, in *Chinese Economic Journal*, Vol. II. No. 2, pp. 1-40, February, 1928; Tayeh Wu: A New Index Number of Foreign Exchange Rates, in *Quarterly Journal of Economics and Political Science*, Vol. III, No. 3, pp. 463-509, April, 1935.

IV

Index number of the quantities and prices of imports and exports in China[6]

Two types of index numbers of China's foreign trade have been published by the Institute for the period from 1867 to date. The one expresses the quantities and prices of imports and exports in percentages of a base year, and is referred to as the *unadjusted* index; while the other expresses the original data as deviations from a computed trend and is referred to as the *adjusted index.*

Unadjusted index: The value of articles entering into the *direct* calculation of the unadjusted index of imports or exports represents something over two-thirds of the total import-value or export-value, but an adjustment is made for those articles *not directly covered* in the calculation. Briefly, we arrive at an estimation of the price movement of the articles *not directly covered* on the basis of the price movement of the other articles after having excluded those with abnormal price fluctuations. Dividing the price movement thus estimated into the value of the articles *not directly covered*, we arrive at a "derived quantity" for those articles included in the final calculation of the index numbers. In view of the frequent changes in the nature, number and importance of the articles imported and exported every year the chain base system has been adopted. Under the chain base system, each year's index number is first calculated as a separate link relating to the preceding year's, and these year-to-year figures are jointed together by the process of multiplication so as to form chain figures relating to 1913 as 100%. The formula used in the computation of the indexes is Fisher's "ideal formula" which is obtained from four magnitudes, namely; $\Sigma P_1 Q_1$, $\Sigma P_0 Q_0$, $\Sigma P_1 Q_0$, $\Sigma P_0 Q_1$. These four magnitudes are used, in different order, for the price index as well as for the quantity index. The formula for the price index is:

$$\sqrt{\frac{\Sigma P_1 Q_1}{\Sigma P_0 Q_1} \times \frac{\Sigma P_1 Q_0}{\Sigma P_0 Q_0}}$$

and that for the quantity index is:

$$\sqrt{\frac{\Sigma Q_1 P_1}{\Sigma Q_0 P_1} \times \frac{\Sigma Q_1 P_0}{\Sigma Q_0 P_0}}$$

6. For a fuller explanation, see Franklin L. Ho: *Index Number of the Quantities and Prices of Imports and Exports and of the Barter Terms of Trade in China, 1867-1928,* Nankai Institute of Economics, Tientsin, 1930,

Adjusted index: For the computation of the adjusted index, the lines of trend are all mathematically determined, and the form of line selected for the purpose is a second degree parabolic curve. With the lines of trend thus determined, every item of the series — quantity as well price indexes of imports and exports — is expressed as a percentage of the corresponding ordinate of the line of secular trend for the series. Deviations of the items from the line of secular trend are thus conceived of as departures from the normal or 100%, i.e. the adjusted index.

In conclusion, it may be mentioned that the work on the compilation of the index numbers included in the present report devolves largely on Mr. Tayeh Wu (吳大業) who has charge of the Statistical Laboratory of the Institute, but the preparation of the report for publication has been done by Mr. W. C. Wang (王文鈞), Research Fellow in Statistics of the Institute.

Franklin L. Ho
Director

Nankai Institute of Economics
January 1, 1935

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APPENDIX

表一： 華北批發物價指數 (按工業分類)

Table I. Index Numbers of Commodity Prices at Wholesale in North China (Classified by Industries)

1926=100

甲. 每年平均

A. Yearly Averages, 1913-1935

	食物 Foods	布疋及其原料 Cloths & Clothing	金屬 Metals & Metal Products	建築材料 Building Materials	燃料 Fuels & Light	雜項 Miscellaneous	總指數 All Commodities	銀元購買力較1926年平均(100)增(+)或減(-)之百分數 Purchasing Power of the dollar; Cents above (+) or below (-) 1926 average of 100
1913	64.27	65.47	80.24	70.53	61.02	78.67	**67.18**	+48.85
1914	63.86	61.20	78.02	79.50	61.51	73.98	**66.89**	+49.50
1915	64.20	65.53	91.41	74.54	61.75	85.09	**68.78**	+45.39
1916	66.36	72.98	118.95	80.06	68.97	84.07	**74.19**	+34.79
1917	71.30	83.29	135.40	84.23	70.59	84.30	**79.95**	+25.08
1918	68.30	96.64	158.54	87.17	74.63	75.99	**82.21**	+21.64
1919	66.92	107.05	111.05	86.78	75.71	77.88	**81.07**	+23.35
1920	82.47	104.33	133.61	81.88	75.71	83.17	**88.92**	+12.46
1921	82.24	99.78	124.61	88.80	78.75	83.29	**88.91**	+12.47
1922	79.92	99.33	97.05	99.10	78.47	85.50	**86.40**	+15.74
1923	84.96	107.41	95.44	94.12	77.02	88.56	**90.35**	+10.68
1924	89.24	109.70	97.65	93.89	84.10	89.76	**93.61**	+ 6.83
1925	95.89	108.21	98.26	94.42	90.60	96.03	**97.28**	+ 2.80
1926	100.00	100.00	100.00	100.00	100.00	100.00	**100.00**	
1927	106.95	99.96	101.22	95.04	101.52	108.11	**103.02**	- 2.93
1928	113.07	103.26	99.51	103.81	110.02	110.72	**107.98**	- 7.39
1929	116.52	107.35	104.63	107.45	109.77	107.40	**111.08**	- 9.97
1930	119.72	103.76	131.67	104.34	116.50	116.11	**115.85**	-13.68
1931	114.39	117.03	145.34	116.88	139.43	132.35	**122.55**	-18.40
1932	108.53	107.55	120.71	121.06	125.30	103.90	**112.87**	-11.40
1933	91.86	97.87	111.86	112.99	116.40	96.23	**100.59**	- 0.59
1934	79.52	90.73	105.60	106.22	110.99	97.66	**91.78**	+ 8.96
1935	94.49	86.96	99.05	102.69	104.04	89.80	**95.42**	+ 4.80

圖一 華北批發物價指數 (按工業分類)

CHART I INDEX NUMBERS OF COMMODITY PRICES AT WHOLESALE IN NORTH CHINA

(CLASSIFIED BY INDUSTRIES)

1913 - 1935 1926=100