

This PDF is a selection from an out-of-print volume from the National Bureau of Economic Research

Volume Title: The National Income and Its Purchasing Power

Volume Author/Editor: Willford Isbell King, assisted by Lillian Epstein

Volume Publisher: NBER

Volume ISBN: 0-87014-014-0

Volume URL: <http://www.nber.org/books/king30-1>

Publication Date: 1930

Chapter Title: III. Index Numbers For Use As Deflators

Chapter Author: Willford Isbell King

Chapter URL: <http://www.nber.org/chapters/c6381>

Chapter pages in book: (p. 65 - 72)

## CHAPTER III

### INDEX NUMBERS FOR USE AS DEFLATORS

#### **Dollar Has a Fluctuating Value.**

The most convenient unit for measuring the income of the people of the United States is the dollar. But, as it happens, the dollar of 1909 was a very different unit from the dollar of 1919, and the latter in turn had little resemblance, in its purchasing power, to the dollar of 1921. Although, throughout the period, the United States Government has always been ready to redeem its money in gold dollars of constant weight, these gold dollars have varied greatly in their ability to purchase goods. If, therefore, we were to express the income of the people of the nation in terms of the dollars of the various years and make no further corrections, the changes in totals would have little real significance, and we might be accused of attempting to deceive the public as to the facts. What counts with the average citizen is not how many dollars he receives per annum, but how many goods a given number of dollars will buy. To ascertain this fact, it is necessary first to compute the number of dollars of income which he receives in each year and next to discover the relative quantities of goods purchasable in the various years with the income received. The most feasible way to accomplish this is first to construct a series of index numbers representing the relative changes in the average value of all goods bought, and then to divide the number of dollars received in each year by the appropriate index for that year.

#### **Single Index Series Unsatisfactory as Deflator.**

Evidently no two citizens buy in any given year exactly the same kinds and quantities of goods. Yet, to convert the income of a citizen to terms of constant purchasing power, the only accurate method is to divide by an index representing the average prices of goods which he has purchased. For this purpose it is necessary to have as many index numbers as there are purchasers. Under the circumstances the statistician must classify the inhabitants of the nation into a few broad classes, and then must arbitrarily calculate an index number presumably applicable to each class. This process manifestly does some violence to the facts. Were it true that the prices of goods bought by the various citizens in a class pursued

radically different trends, it would, then, necessarily follow that the results obtained by putting citizens into classes would be wholly meaningless. Fortunately for the statistician, however, the prices of various classes of goods tend to have fluctuations resembling each other to a considerable extent; hence differences in the make-up of individual budgets do not affect greatly the course of the price averages. This fact explains why an average index number may give results which, after all, are not meaningless.

### **Upon What Commodities Should the Deflating Index Be Based?**

Granted that we are to calculate separate index numbers for several classes of the population, we are still confronted by the fact that the members of each class of the population buy a great variety of goods. During the year they purchase consumers' goods, producers' goods, securities, life insurance, in fact a multitude of material goods and services. Which of these commodities shall be included in the list used in making up the index number used for purposes of deflation?

### **Why Indices of the Prices of Consumers' Goods Are Used as Deflators.**

For several reasons it seems wisest to use, in the construction of an index number, the values of consumers' goods only. First, all other classes of goods are purchased not with a view to the service which they themselves will render, but in expectation that they will add to the possibilities of economic gain. The services anticipated from all classes of production goods, securities, etc. are then *indirect*, while the services rendered by consumers' goods are *direct*. This means that the market values of all indirect goods depend upon guesses as to the probable values in the future of the direct or consumers' goods into which the indirect goods are expected to mature. Thus, the present price of wheat is dependent upon the anticipated price of the bread into which it is ultimately to be converted; the present price of lumber depends largely upon the anticipated rent of the houses which are to be built from the lumber; the present worth of a share of stock depends upon the dividends which it is expected will be paid upon that stock in the future; and these dividends in turn depend upon income determined by future differentials existing between the prices of goods and services purchased by the corporation and prices of goods and services sold by the corporation. Evidently, then, prices of raw materials are at least one or two stages removed from the point at

which the consumer compares the gratification derivable from the consumption of the goods with the utility of the money which it takes to buy it. Security prices are several stages removed from this goal. Now, since the total income of the people of the nation varies but slowly, and since the total volume of wants and the total volume of goods produced to supply these wants fluctuate but little, the general tendency is for the average prices of direct or consumers' goods to vary but little from month to month and year to year, unless some marked change occurs in the currency supply of the country. The prices of indirect goods, however, show no such tendency to remain stable. It is, for example, generally true that the fluctuations occurring in the prices of wheat, steel, cotton, and the like are much greater than are the fluctuations in the prices of consumers' goods. Security prices, being still further removed from the ultimate goal of consumption, oscillate still more vigorously. Observation shows that the usual tendency is for index numbers representing the prices of indirect goods to fluctuate above and below a normal represented by the index series representing the prices of direct goods. The relationship doubtless arises from the fact that the prices of indirect goods are influenced by all kinds of guesses, rumors, and misconceptions, while the prices of direct goods are affected, in the main, by the immediate forces of supply and demand existing at the given time. Since the prices of direct goods represent reality, while the prices of indirect goods represent merely guesses as to future realities, there is always a tendency for the guesses to be corrected from time to time in the direction of reality. Hence we find the index numbers of commodities at wholesale fluctuating about a norm consisting of the index numbers of commodities at retail. For purposes of deflation, it is more convenient to use a series of index numbers which do not fluctuate widely, and it also seems more desirable to employ for this purpose index numbers representing actual conditions of supply and demand at the given time rather than those portraying changes in the psychology of the public. The facts just enumerated furnish, then, one strong argument for using as deflators indices of the prices of consumers' goods.

A second reason for using the prices of direct or consumers' goods in order to reduce the income of the people of the United States to dollars of constant purchasing power, is that the entire population are immediately interested in the prices of consumers' goods. Very many similarities exist in the consumption of goods by different families in a given income class in a specified locality. If you know

TABLE VII

ESTIMATED INDICES OF THE AVERAGE  
PRICES OF DIRECT OR CONSUMPTION  
GOODS USED BY DIFFERENT CLASSES  
OF THE POPULATION

(AVERAGE FOR 1913 = 1.000)

DATE	SEMI-ANNUAL INDICES*					AVERAGE FOR YEAR INDICES				
	Urban, Man- ual and Cler- ical Work- ers	Farm La- bor- ers	Farm- ers	Families Spend- ing for Direct Goods		Urban, Man- ual and Cler- ical Work- ers	Farm La- bor- ers	Farm- ers	Families Spend- ing for Direct Goods	
				\$5,000	\$25,000				\$5,000	\$25,000
1909 Jan. 1	.938	.976	.946	.929	.944					
July 1	.933	.980	.951	.927	.945	.945	.989	.968	.936	.951
1910 Jan. 1	.975	1.022	1.024	.961	.969					
July 1	.964	1.006	.971	.959	.969	.969	1.006	.995	.962	.969
1911 Jan. 1	.972	.991	1.012	.970	.971					
July 1	.957	.974	.939	.958	.960	.969	.977	.973	.966	.966
1912 Jan. 1	.991	.967	1.000	.980	.975					
July 1	.976	.967	.978	.971	.971	.982	.972	.987	.978	.978
1913 Jan. 1	.988	.988	.992	.992	.993					
July 1	.999	1.009	.983	.997	.999	1.000	1.000	1.000	1.000	1.000
1914 Jan. 1	1.015	.995	1.042	1.013	1.008					
July 1	1.009	.974	.992	1.006	1.000	1.017	.976	1.008	1.006	1.002
1915 Jan. 1	1.030	.960	1.006	1.001	1.002					
July 1	1.031	.949	.954	.983	.995	1.035	.962	.985	.996	1.005
1916 Jan. 1	1.057	.993	1.024	1.019	1.028					
July 1	1.100	1.036	1.083	1.050	1.056	1.116	1.040	1.108	1.064	1.064
1917 Jan. 1	1.183	1.094	1.242	1.139	1.118					
July 1	1.292	1.197	1.430	1.223	1.180	1.304	1.201	1.409	1.222	1.181
1918 Jan. 1	1.428	1.316	1.533	1.301	1.245					
July 1	1.589	1.474	1.565	1.419	1.348	1.572	1.472	1.613	1.422	1.346
1919 Jan. 1	1.750	1.622	1.789	1.550	1.442					
July 1	1.785	1.733	1.800	1.611	1.497	1.831	1.754	1.845	1.640	1.522
1920 Jan. 1	2.003	1.926	1.988	1.790	1.654					
July 1	2.172	2.032	2.115	1.940	1.779	2.088	1.963	2.001	1.872	1.739

(Continued on next page)

TABLE VII—Continued

ESTIMATED INDICES OF THE AVERAGE PRICES OF DIRECT OR CONSUMPTION GOODS USED BY DIFFERENT CLASSES OF THE POPULATION

(AVERAGE FOR 1913 = 1.000)

DATE	SEMI-ANNUAL INDICES*					AVERAGE FOR YEAR INDICES				
	Urban, Manual and Clerical Workers	Farm Laborers	Farmers	Families Spending for Direct Goods		Urban, Manual and Clerical Workers	Farm Laborers	Farmers	Families Spending for Direct Goods	
				\$5,000	\$25,000				\$5,000	\$25,000
1921 Jan. 1	1.980	1.861	1.787	1.816	1.745					
July 1	1.766	1.522	1.457	1.657	1.655	1.800	1.584	1.557	1.681	1.667
1922 Jan. 1	1.733	1.432	1.528	1.593	1.611					
July 1	1.670	1.392	1.458	1.567	1.601	1.676	1.398	1.481	1.579	1.608
1923 Jan. 1	1.693	1.376	1.481	1.587	1.620					
July 1	1.700	1.447	1.420	1.596	1.611	1.707	1.436	1.452	1.598	1.615
1924 Jan. 1	1.732	1.476	1.485	1.612	1.616					
July 1	1.691	1.456	1.420	1.585	1.598	1.706	1.460	1.466	1.601	1.608
1925 Jan. 1	1.730	1.452	1.540	1.621	1.620					
July 1	1.745	1.438	1.573	1.635	1.642	1.744	1.451	1.588	1.637	1.641
1926 Jan. 1	1.774	1.477	1.667	1.657	1.659					
July 1	1.743	1.423	1.617	1.632	1.630	1.755	1.440	1.621	1.638	1.638
1927 Jan. 1	1.751	1.437	1.583	1.632	1.632					
July 1	1.718	1.403	1.501	1.605	1.608	1.722	1.416	1.529	1.611	1.618
1928 Jan. 1	1.715	1.422	1.524	1.603	1.619					
July 1	1.700	1.395	1.495	1.577	1.586	1.706	1.402	1.503	1.586*	1.598*
1929 Jan. 1	1.708	1.398	1.498	1.589*	1.600*					

\* For mode of estimation, see the report of this Bureau, entitled, *Income in the Various States*, pp. 25-27.  
 \* Preliminary estimate.

the income of a family in a certain city at a particular date, you can predict with a reasonable degree of accuracy the grade of food they will eat, the size and furnishings of the house they will live in, the kind of clothes they will wear, the mode of transportation which they will enjoy, and the amusements in which they will indulge. It is, therefore, not impossible to construct an index number which

will, in a broad way, represent the prices of goods used by a given income class.

### **To Deflate the Income of Different Sections of the Population Different Index Numbers Are Required.**

To predict, however, in what classes of commodities or in what enterprises the various income classes will invest their surplus funds, is a matter of much greater difficulty. Statistics along this line are extremely scanty. It follows, then, that, even if it were desirable, it would be statistically impracticable to compile index numbers of indirect goods which could be depended upon to typify the expenditures of the various categories of the population.

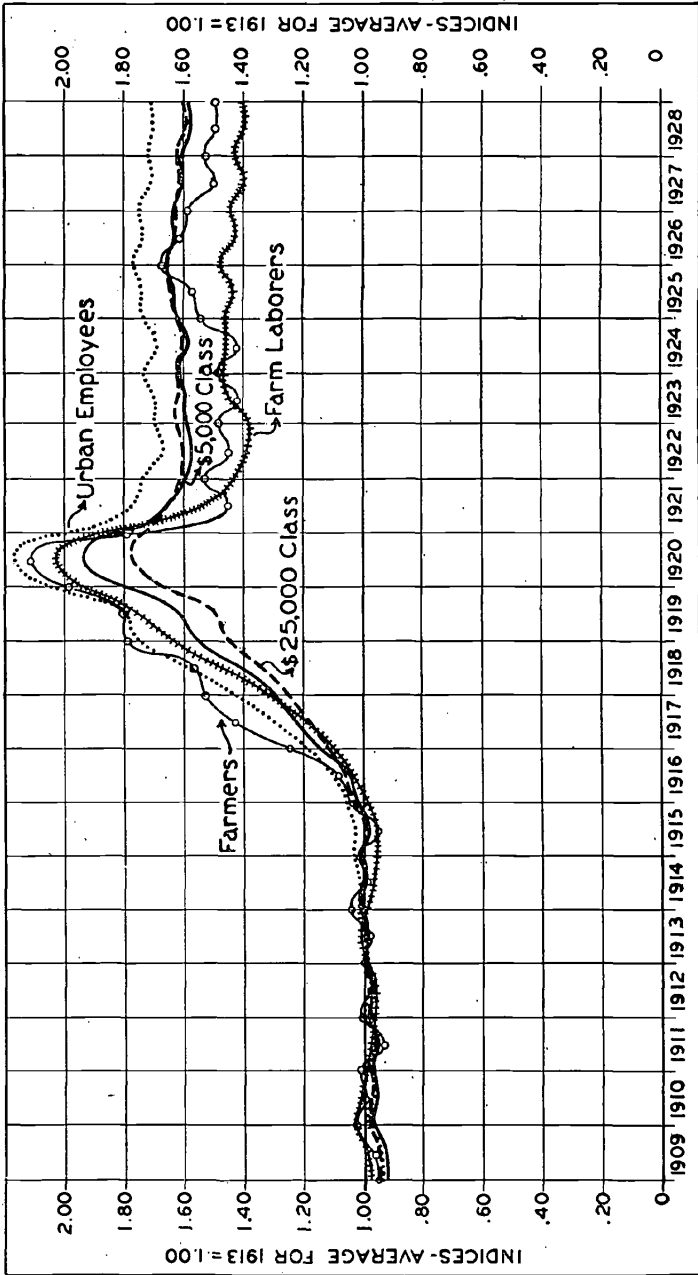
### **Nature of Five Series of Index Numbers.**

The index numbers appearing in Table VII represent the estimated average fluctuations in the prices of commodities supposed to have been consumed respectively by each of the five classes of families mentioned. For any given class, the index numbers are intended to show the relative changes in the prices of goods used by the average family in that group in the period 1919-1921. In order to make the figures fairly comparable from year to year, an effort has been made to compare prices of the same quantities of identical commodities in all years. Since most commodities are changing their form from time to time, it is, of course, in practice, impossible to compute index numbers which will completely satisfy this condition. We cannot be sure, for example, that certain of the commodities presented are of exactly the same quality at all the specified dates. In some instances, it has been necessary to substitute a new commodity for another which has gone out of use. The index numbers presented must, then, be understood to represent merely approximations to the truth, but care has been taken to make these approximations as close as is feasible, considering the resources at the command of the investigators. Those interested in a more detailed description of the method of computing these index series and of the weights applied to the various commodities, are referred to pages 25-27 of the publication of this Bureau entitled *Income in the Various States*.

### **Comparative Movements of Five Index Series.**

Reference to the figures in Table VII and to Chart 5 shows that all five of these index series moved along a trend somewhat horizon-

# INDICES OF THE PRICES OF CONSUMPTION GOODS<sup>a</sup>



For data see Table VII.



tal, though perhaps sloping slightly upward, from January 1, 1909 to July 1, 1915. After the latter date, currency inflation had its effect, and all five index numbers rose rapidly along almost straight lines until the middle of 1920. The price rise in this period, although not nearly as great as that characterizing the increase in prices of commodities at wholesale, nevertheless amounted to from 78 to 122 per cent, and proved great enough to throw into confusion the whole economic life of the country. The prices of goods used by farmers and urban employees reached peaks higher than those of the other three index series, while the indices of the prices of goods used by the richer classes of consumers did not ascend so steeply. When the price crash came in the latter half of 1920 and the first half of 1921, it was the price indices representing the cost of goods purchased by farmers and farm laborers which fell fastest and farthest. These index numbers, being dependent to no small extent on the prices of home-produced commodities consumed on the farms of the producers, were pulled down by the collapse in the price of farm produce in 1920 and drifted downward until the middle of 1922. Since that date, four of the index numbers have pursued trends approximately horizontal, but having perhaps a slightly upward inclination. All five of the index series rose somewhat above the usual level at the close of 1925, but, around that date, the prices of consumers' goods used by farmers showed much more tendency to rise than did the prices of goods used by any of the other groups. In the middle of 1928, all five series stood at a point noticeably lower than the positions which they respectively occupied at the beginning of 1926. During the last half of 1928, however, a slightly rising tendency is apparent, but this may represent nothing more than a seasonal movement.