IX.—WORLD'S INDEX-NUMBER OF PRICES.

1. **General.**—Very diverse reasons have been put forward for the world-wide movements in prices, such as the rise which occurred prior to the early seventies, the following decline, and, again, the rise in more recent years. While it is not the essential aim of this Report to analyse the cause of price movements, it is desirable to refer briefly to certain statistical and historical aspects of what is so frequently stated to constitute one of the main controlling factors—*viz.*, the world's gold-supply.

The following table shews the value of the average annual gold production of the world during each year since 1851, and the estimated annual production during the period 1840 to 1850. The "world's index-number of prices," shewn in the same table, has been compiled from the index-numbers for the countries already referred to, by weighting each index-number by a number proportional to the population of the country to which it refers (see p. 76 hereinbefore).

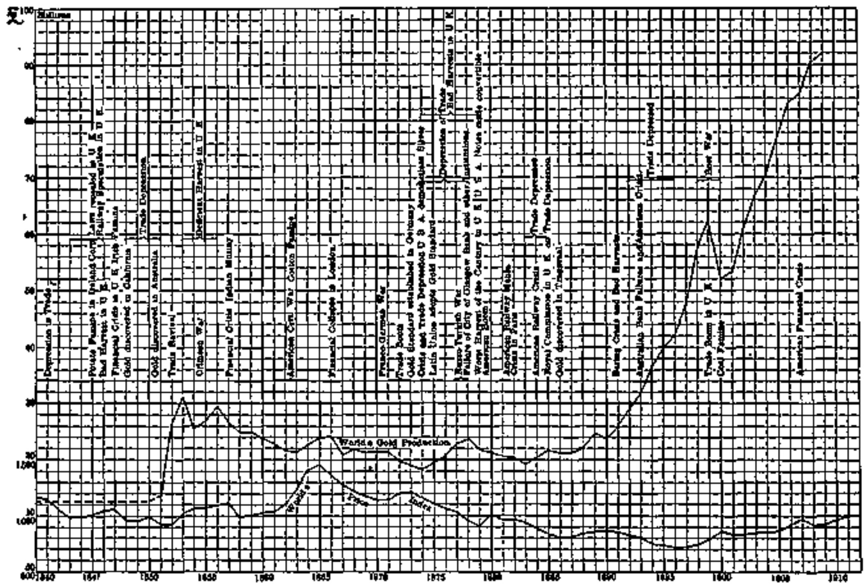
World's Index Numbers and World's Gold Production, 1840 to 1911.

Year.	World's Index No.*	World's Gold Production. £0,000 omitted.	Year.	World's Index No.*	World's Gold Production. £0,000 omitted.
1840	1,165		1876	1,056	2,074
1841	1,146		1877	1,030	2,280
1842	1,058		1878	950	2,380
1843	985		1879	903	2,180
1844	992		1880	1,016	2,132
1845	1,010	1,250	1881	955	2,062
1846	1,041		1882	964	2,040
1847	1,052		1883	938	1,908
1848	961		1884	887	2,034
1849	956		1885	838	2,168
1850	996		1886	807	2,120
1851	928	1,354	1887	809	2,106
1852	923	2,656	1888	837	2,204
1853	1,021	3,110	1889	853	2,470
1854	1,071	2,550	1890	865	2,377
1855	1,073	2,702	1891	855	2,613
1856	1,095	2,952	1892	825	2,926
1857	1,115	2,666	1893	810	3,169
1858	991	2,494	1894	750	3,650
1859	1,004	2,498	1895	732	3,980
1860	1,026	2,386	1896	716	4,225
1861	1,033	2,276	1897	721	4,820
1862	1,102	2,156	1898	749	5,814
1863	1,243	2,140	1899	797	6,301
1864	1,416	2,260	1900	864	5,209
1865	1,463	2,404	1901	831	5,334
1866	1,368	2,420	1902	830	6,062
1867	1,273	2,080	1903	847	6,676
1868	1,212	2,194	1904	850	7,052
1869	1,186	2,124	1905	864	7,688
1870	1,137	2,138	1906	923	8,317
1871	1,142	2,140	1907	978	8,476
1872	1,206	1,992	1908	915	9,036
1873	1,215	1,924	1909	931	9,308
1874	1,153	1,816	1910	970	9,419
1875	1,100	1,950	1911	**1,000**	..

* This cannot, of course, be strictly calculated for reasons which will be clear on referring to Appendixes VIII. and IX.

The preceding figures are shewn in the following graph:—

WORLD'S INDEX-NUMBERS AND WORLD'S GOLD-SUPPLY, 1840 TO 1911.



The increase in the annual gold production and the rise and fall in average prices may be more readily seen by taking averages for quinquennial periods. The following table accordingly shews the value of the average annual gold production and the average of the annual index-numbers for each quinquennial period since 1841:—

Value of Average Annual World's Gold Production and Average of corresponding Worlds' Index-Number for each Quinquennial Period from 1841 to 1910.

Period.	Average Index-Number.	Average Annual Gold Production. (£0,000)	Period.	Average Index-Number.	Average Annual Gold Production. (£0,000).
1841-55	1,038	} 1,250	1881-85	916	2,042
1846-50	1,001	}	1886-90	834	2,255
1851-55	1,003	2,474	1891-95	794	3,268
1856-60	1,046	2,599	1896-1900	769	5,274
1861-65	1,251	2,247	1901-05	844	6,562
1866-70	1,235	2,191	1906-10	943	8,911
1871-75	1,163	1,964	**1911**	**1,000**	*
1876-80	991	2,209			

* Not available.

The average value of the world's production during the decade 1841 to 1850 was only £12,500,000; but it may be seen that in the next quinquennium the average value of the production had risen to £24,740,000 and £25,990,000 between 1856 and 1860, *viz.*, during the great impetus given by the almost simultaneous discoveries in Australia and California. It then fell to £19,640,000 in 1871-5.

When the rich alluvial deposits in these countries began to be worked out, and until the opening of the Transvaal mines, it remained fairly constant. It was then, viz., in about 1888, that the production commences to take an upward sweep, as the graph will shew. In 1891 the value produced exceeded £26,000,000, in 1898 it was £58,140,000, and in 1899 £63,010,000; then after a momentary reaction, caused by the South African War, the output rose to £66,760,000 in 1903, and to £94,190,000 in 1910. From 1896 to 1910 the output increased rapidly. The opening of the Klondike mines and the discovery and application of the cyanide process had important effects on the production. Thus, in 1910 the output was very nearly four times as great as in 1890, twenty years earlier.

The index-numbers given in the above table, being based on prices in all countries for which index-numbers are available, are, of course, more directly applicable than any others in an investigation into the relation between world's gold-supply and prices.

Now an examination of these two graphs shews several instances of corresponding upward or downward movements, which may be to some extent due to some law acting between the gold-supply and the world's prices, though, even if this be so, prices do not, in general, seem to feel the reaction set up by a change in the gold-supply, at least not till after a very noticeable interval. It is probably true that the important factor to consider, when estimating the effect of gold on prices, is not so much the annual production, as the quantity and rapidity of gold in circulation relatively to the varying demand for gold, arising, among other things, by extensions or contractions of credit. Notwithstanding that a large quantity of statistical material bearing more or less directly on these matters has been collected, no reliable estimates of gold in circulation, and therefore of velocity of circulation, are available, except for one or two countries.

2. **From 1850 to 1857.**—One of the most marked and frequently cited coincidences between increase in gold-production and a rise in prices is that which marks the periods between 1851 and 1857, following the abnormal and exceptional discoveries in Australia and California.

The increased output of gold in the fifties first found its way to Europe and the United States, and resulted in a large increase in the coinage of gold in England, France, and the United States, and thus, in the quantity of gold in actual circulation. The impetus given to general settlement by the gold discoveries (as in Victoria) created a demand for manufactured commodities, which tended to accelerate the rise in prices. Other influences, too, were operating in the same direction. The Crimean War tended to raise the price of many commodities, while in various countries, and especially in England, it is probable that a considerable extension of credit took place. Under the stimulus of abundant loan capital and an optimistic spirit of expanding trade, many new enterprises were started. During the years 1853 to 1856 there were bad seasons in England, and the price of foodstuffs rose to a high point. In 1857-8—at the time of the Indian Mutiny—the index-number shews a decline from 1115 to 991, and then, again, moves upward until 1865, when it was as high as 1463.

3. **Prices High from 1858 to 1873.**—The expansion of trade in the sixties was greatly assisted by the extension of the Limited Liability Acts to banking corporations in 1858, and by the passing of the Company Act, 1861, which gave a great impetus to the flotation of joint-stock enterprises. Inventions and discoveries also did much to assist the boom, as also did improvements in transport facilities and in the arts of manufacture. The introduction of the Bessemer process of steel making in 1859 is a landmark in the industrial history of the period.

Important influences are, on the other hand, commonly supposed to have operated in the opposite direction, such as the numerous wars during the fifties and sixties, which not merely kept men from productive occupations, but caused a considerable loss in life and property. When it is remembered that the period includes, among others, the Crimean, Austro-Prussian, Franco-Prussian, Danish and Italian wars in Europe, and the Civil War and the Mexican campaigns of Napoleon III. in America, it may readily be appreciated that war must have had adverse effects on trade and general prosperity.

From 1858 to 1865 prices rose rapidly, largely owing to the abnormal conditions in the United States of America. During this period, however, the gold production generally decreased. Between 1862 and 1866, the American Civil War cut off Lancashire's supply of cotton, and though this shortage stimulated cotton-growing in India and other countries, the supplies were quite insufficient. The cotton famine naturally had an effect on other textiles, and the price of wool and flax rose rapidly. After the end of the war prices again fell, but not quite to their old level. In the following period up to 1873, the output of gold continued to decrease, while prices shewed a marked rise from 1871 to 1873. Reviewing the whole period from 1855 to 1875, the decrease in the gold-production, coinciding with an extension of civilisation and trade over the whole world, and with new needs for gold, ought, it seems, on the theory which holds that the supply of gold is the supreme influence, to have led to a general fall in the price of commodities. Still, it is contended that the increased gold output of the previous years had not yet become insufficient to meet the consumption at the enhanced prices, and so the continuation of industrial development would still tend to exercise a predominant influence. So that, although it is stated that in the case of many manufactured articles a fall in price really occurred, owing to the boom in trade, reduced cost of transport, and other causes, natural products continued to increase in price, and the index-number for all commodities to rise. Speaking generally, it is probably true that the annual production of gold during the twenty-two years, from about 1851 to 1873, was available for monetary purposes, whereas the quantity available for the following two decades was largely absorbed by the extra demand due to changes in the monetary systems, so that the total monetary circulation did not increase during the latter period, even relatively to the reduced output of gold, to the same extent as in the former period.

4. **Prices Falling from 1873 to 1896.**—The period 1873 to 1896 was marked by a progressive fall in prices, this time probably in conformity with the stagnation or recoil in the supply of gold in relation to the demand therefor. It may be seen (see page 87) that from 1878 to 1883, there was a considerable decline in the world's production

of gold, but that after the following six years the output regained its former value. The important fact appears, however, to be that these years saw a great increase in the demand for gold. Immediately after the Franco-Prussian war, Germany decided to establish her currency on a gold basis, and a law to that effect was passed in December, 1871. The gold standard was not introduced until 1873, though it is stated that considerable importations of the precious metal took place immediately.* Further, the United States commenced to draw gold from Europe in 1878, consequent upon a law making the inconvertible Government bank-notes, which had been issued during the Civil War, convertible into gold at the United States Treasury. There is no reason to doubt that this resumption was followed by a great extension in the use of gold, and a country which was formerly one of the chief sources of supply began to reabsorb some of the world's gold. In other countries, too, currency reforms were effected at or about this period, and gold became practically the sole standard measure of value.* It may here be observed that the question of currency reforms in relation to the supply of gold is greatly complicated by various considerations, such as (*a*) changes in the rapidity of circulation of money, (*b*) economies in the use of coin either in international trade, by the payment of balances, by the transfer of stocks, or in general trade by the extension of banking facilities on the introduction of paper money, and (*c*) the amount of credit instruments in circulation, which varies with the commercial habits of the people and the character of the banking system.

It is alleged by many economists that the increase in production at this period had an important effect on prices. The highly remunerative prices hitherto prevailing are stated to have greatly stimulated production, and when prices declined, it is said that producers in many branches of trade were obliged to further increase their production, in order to balance, at least to some extent, the shrinkage of values.

The diminution in the cost of production and conveyance at this time probably had its greatest effect in extra-European Countries. As there had been a European era of the development of steam and of railways, so there was now an extra-European era. Not only were existing settlements connected, but the railroads were taken through uncultivated and sparsely populated districts, which were thus opened for new settlement. The producer could not only convey his products cheaper and quicker to port and to other countries, but he could also obtain his requirements at less cost and more rapidly. The effect of long distances was reduced owing to the better communications, and the increasing civilisation in the new countries attracted an increasing number of immigrants. Land was abundant, and other factors of production, such as labour and capital, were more easily acquired.

Steamers superseded more and more sailing vessels; their number increased enormously, and as they travelled three times as quick, their tonnage counted thrice that of the sailers. The opening of the Suez Canal had an additional influence in accelerating the conveyance of goods.

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* See "On Prices of Commodities and the Precious Metals," A. Sauerbeck. "Journal of the Royal Statistical Society, London, Vol 49 (1868), p 587.

* See "An Introduction to the Study of Prices," W T. Layton, M.A., London, 1912.

Another influence upon commerce generally may be ascribed to telegraphic communication; this kept producer and consumer in closer touch. As products could be quickly exchanged between various countries, less dependence was placed upon stocks, and the market could not be so easily manipulated by speculators. Also, the effect of bad harvests in certain districts or countries was minimised, as, thanks to the quick communications, a deficit in one country could be covered by an excess in another. If heavy stocks still existed, it was owing chiefly to the great production, and the unprofitable state of business, not to any great necessity for them; they consequently weighed upon the market with additional force, and caused a greater depression than similar quantities would have occasioned in former periods.

Last, but not least, may be mentioned the inventions of the period. Attention may specially be directed to the improvements in the smelting of ore, in the production of steel, and in the sugar industry; to the development of the chemical industry, and to the improvement of machinery in all branches.

To sum up, the following are the causes which have been alleged to be responsible for the appreciation in the purchasing power of gold during the period between 1873 and 1886.*

(*a*) Reduction in the cost of production would tend to cause the prices of these commodities to fall and to produce changes in relative prices, but would have no effect on the general price-level unless the quantities produced were increased.

(*b*) Reduction in the cost of transport would produce no effect on the general price-level, unless it led to an increase in the quantities of commodities produced, or to an increase in the number of exchanges.

(*c*) The reduced cost of production and the reduction of cost of transport would probably, and did in fact, cause changes in the relative advantages of different countries in the international trade of the world, which would have the effect of altering the internal scale of prices and wages in the countries affected.

(*d*) There was an increase in the quantities of commodities produced and an increase in the number of exchanges, both causes tending to bring about a fall in the general price-level.

(*e*) There were additional demands for gold due to the substitution of the gold for the silver standard in certain countries.

(*f*) There were additional demands for gold due to changes from inconvertible paper to a metallic (gold) standard.

(*g*) There were special demands for gold due to the great development of the United States of America. This cause is, to some extent, identical with that stated in (*c*).

(*h*) There was some reduction in the yearly production of gold.

From 1890 onwards the gold output began to rise with a rapidity probably without precedent. Yet the fall in prices for some years steadily continued, with a few interruptions (from 1886 to 1890) until 1896, thus shewing once more the same discordance, at least apparently, between the two phenomena. Perhaps there is something

* See "The Standard of Value." Sir David Barbour, K.C.S.I., K.C.M.G., London, 1912.

analogous at this stage to what occurred in the other direction during the period between 1858 and 1873; and it is probable that any influence which the output of gold exercises on prices takes some years to shew itself. In any case, moreover, evidence as to increase in gold supply does not appear to be conclusive, until it is known whether a greater increase in the number of business transactions occurred involving increased use for gold. A feature of the period was the increase in overseas trade. It is obvious that increase of trade of this kind tends to bring about an even greater use of currency than increase in domestic trade, for every time that a commodity changes hands metallic currency or a credit document of some kind is given in exchange, and commodities brought to market from overseas will ordinarily change hands a greater number of times than domestic produce. Thus, as trade is developed and becomes more world-wide, a greater demand for currency or its equivalent tends to be brought about. It is unlikely, indeed, that there was any actual shortage of gold during this period, but prices are determined not only by the absolute amount of currency, but by the relative quantity of currency as compared with the volume of trade which it has to do and with other matters.

This view of the question has been presented by Professor Irving Fisher,* who points out that the total amount of money expended on commodities in a given community during a given period is equal to sum of the product of the average price of sale of each commodity into the quantity of such commodity sold. This must be equal to the amount of money in circulation among the community for that period, multiplied by its velocity of circulation. The money by which payment is made consists of (*a*) actual coin in circulation, and (*b*) credit money based on gold and on other forms of property deposited in the banks, the latter usually taking the form of bank-notes, cheques, and bills of exchange.† Therefore, it follows that the sum of (*a*) the amount of legal-tender currency in circulation multiplied by its velocity of circulation, and (*b*) the amount of credit money in circulation multiplied by its velocity, is equal to the sum of the prices of all commodities multiplied respectively by the quantity of each commodity sold. The general price-level, or the average of the prices, for the period is therefore equal to the sum of (*a*) the legal-tender currency multiplied by its velocity of circulation, and (*b*) the credit money multiplied by its velocity, divided by the total quantity of commodities sold.‡ It is, therefore, clear that *the general level of prices depends directly upon five factors, viz., (i.) The amount of money in circulation. (ii.) Its velocity of circulation.*

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* See "The Purchasing Power of Money." Prof. Irving Fisher. New York, 1911

† See "Report of Commission on Cost of Living in New Zealand." Wellington, 1912, p. xxxv.

‡ The "Equation of Exchange" may be expressed mathematically as follows :—

If M represent the quantity of actual currency money, and V its velocity of circulation, M_1 the quantity of credit money and V_1 its velocity of circulation; also if the average prices of the various commodities sold during the period under review be P_1, P_2, P_3, etc., and the corresponding quantities sold be Q^1, Q^2, Q^3, etc., respectively, then

$$MV + M_1V_1 = \Sigma(PQ),$$

which may be written

$MV + M_1V_1 = PT$, where P is a weighted average of all the P's, and T is the sum of all the Q's. P then represents in one magnitude *the level of prices*, and T represents in one magnitude the volume of trade.

$$\text{The price level } P = \frac{MV + M_1V_1}{T}.$$

(iii.) The amount of credit money in circulation. (iv.) Its velocity of circulation, and (v.) The total quantity of goods sold, that is the volume of trade. It is obvious that if any one of these factors change in magnitude, there must result a change in the general level of prices; if more than one of them change, the net result on the level of prices will depend on whichever factor has a preponderating influence. The general principle stated by Professor Irving Fisher is that *the price level increases with the increase of money (either currency or credit) and with the velocities of their circulation, and decreases with an increase in the volume of trade.* Reaction to these factors is, however, not instantaneous, nor equally quick for each; hence the actual relation is very complex. It is, moreover, influenced by an element not susceptible of numerical evaluation, *viz.*, the human element of faith or confidence in the stability of economic relations at a particular moment.

5. From 1896 to 1911, Prices Rising.—The main features of the graph of prices since 1896 are the general upward movement, accompanied by the rises in 1900 and 1907, with a considerable depression in the intervening years, and since 1907 a fall with a further rise to the highest point in 1911. The average levels of the index-number during the three quinquennia, 1896 to 1910, were 769, 844 and 943 respectively, and the corresponding values of the gold production were £52,740,000, £65,620,000 and £89,110,000 respectively. The association of these changes in the same direction is frequently cited as proving the inter-relation between the two phenomena. It has already been pointed out, however, that any relation which may exist is of by no means a simple character.

It is alleged that the enormous additions to the world's gold since 1890 would have caused an economic revolution unless they had been absorbed under very special circumstances.*

The director of the United States Mint has published an estimate of the manner in which the output has been absorbed during the last twenty years. The world's industrial consumption of gold is stated to have been about £114,000,000 during the ten years from 1890 to 1899, and £191,000,000 during the eleven years 1900 to 1910. These figures are exclusive of amounts used in Asia, Egypt, and South America, which for both monetary, industrial and other purposes, are computed to have absorbed during the latter period (1900 to 1910) about £204,000,000. The table given on page 87 shews that the total output during the second period (1900 to 1910) was £825,770,000. Therefore, subtracting the value of that used industrially and also the amount absorbed by Asia, Egypt and part of South America, the remainder available for coinage and bank reserves in Europe, the United States, Canada, Australasia, and parts of South America, would be £430,770,000. There is little doubt that this addition has had a considerable influence in raising prices both directly and indirectly by enabling a large extension of credit to take place. It appears, moreover, that this influence has tended to be more marked in the United States than in other countries, and it is, in fact, stated that the most rapidly rising prices are, in the main, those over which the United States of America exercises a preponderating influence, especially in regard to tin, copper,

* See "An Introduction to the Study of Prices." W. T. Layton, M.A. London, 1911.

and cotton. This contention is, to some extent, borne out by the graphs on page 78 and the tables on pages 77 and 81. From these it may be seen that the increase in price-level in the United States since 1891 has been greater than in any other country except Germany.

In the report of the director of the United States Mint, it is pointed out that it is scarcely conceivable, at any rate under the existing banking system, that the industrial development which has taken place in the United States during the period 1901 to 1910 could have occurred or been financed without the enlarged bank reserves which the gold output provided. In regard to the effect of this development on prices, it is alleged that the operations of large industrial and commercial trusts have accelerated the upward movement of price-levels, and it is asserted that times of rising prices are more favourable than times of falling prices for monopolists who wish to maintain prices at a high level. It should be pointed out, however, that even if the United States had not absorbed such large quantities of gold in recent years, the abundance of currency in other countries might readily (in accordance with the principles of the "quantity" theory) have made the prices of commodities, in the production of which Europe plays the chief part, rise faster and higher than they actually have done.

It is maintained that in many countries the rapid rise of trusts, conferences, pools and other forms of trade combination or agreement belongs to the recent epoch of rising prices and must be considered contributory to it.*

It should be pointed out that, in the view of many economists, the increase in gold-production is not the main primary *cause* of the recent increase in prices. It is stated that the simplicity of that explanation is impaired by a crucial test, viz., the lower price of credit which should follow the increased flow of gold into the bank reserves and stimulate the increased borrowing and the circulation through the banks. It is maintained that no such lowering of the price of credit has occurred, but that, on the contrary, the price of money has been higher than usual during the period of expanding output of gold. While it is admitted that the increased output of gold has been an essential constituent in the production of credit, it is stated that the utilisation of stocks, shares and vendible goods as a credit-basis has facilitated an enormous expansion in the *demand* for credit, so great that, in spite of the tendency of abundant gold to lower its price, that price has actually risen, and, in spite of the rise, the enhanced demand has been maintained. The cause of this increased demand for credit is said to be due to the great development of profitable economic enterprises upon a large business scale that has been taking place simultaneously in a number of new areas of enterprise. The impetus given to development in South America and North West Canada, the entering of Japan upon an era of enterprise, and the general industrial expansion, taken in conjunction with the enlarged output of gold, are said to have involved a rapid and continuous demand for the application of large masses of capital. Moreover, the sinking of a large and growing proportion of the newly created wealth and labour of the world into developmental, but at present unremunerative, processes in the new and backward countries of the world, is said to be attended by a considerable sacrifice from

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* See "Causes of the Rise of Prices" by J. A. Hobson. "The Contemporary Review," No. 562, October 1912.

the standpoint of consumers, in a corresponding immediate rate of increase in output of food and materials. If this be so, when the development of these new countries and enterprises has matured, an increase in output and a fall of prices may then be expected to ensue.*

6. **Conclusion.**—In conclusion, it may be said that, in the present state of knowledge, it would seem impossible to determine with any certainty to what extent the gold-supply directly influences price-levels, but there is evidently ground for the prevalent opinion that the two are closely related. It would seem, however, that any direct influence which the gold output may have on prices, is at many periods less perceptible than the effects of war and militarism, industrial activity and depression, seasonal and climatic influences, change in transport facilities, and methods of production consequent on scientific discovery and invention, the extension of the use of credit instruments, alternating crises in trade and financial speculation, capitalistic and industrial development and other contemporary movements.

*See "Causes of the Rise in Prices" by J. A. Hobson. "The Contemporary Review," No. 562, October, 1912.

APPENDIX I.

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APPENDIX II.

Retail Prices in Metropolitan Towns, 1901 to 1912.

Town.	1901.	1902.	1903.	1904.	1905.	1906.	1907.	1908.	1909.	1910.	1911.	1912 *
Bread, per 2 lb. Loaf.												
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Sydney ..	2.8	3.1	3.7	3.1	3.0	3.0	3.1	3.5	3.6	3.6	3.5	3.3
Melbourne	2.8	2.6	3.0	2.8	2.6	2.5	2.3	3.0	2.6	2.6	2.8	3.0
Brisbane ..	3.0	3.1	3.3	3.0	2.7	2.7	3.1	3.4	3.5	3.3	3.5	3.5
Adelaide ..	3.0	3.0	3.0	3.0	3.0	3.0	3.1	3.1	3.5	3.0	3.0	3.5
Perth ..	3.0	3.8	4.4	3.6	3.5	3.5	3.1	3.5	3.1	3.4	3.5	3.5
Hobart ..	2.8	2.9	3.4	3.0	2.6	2.9	2.9	3.3	3.4	3.3	3.1	3.5
Flour, per 25 lb. Bag.												
Sydney ..	1 11.0	2 7.0	3 4.3	2 0.5	2 7.7	2 6.2	2 8.4	3 0.7	3 3.6	3 0.7	2 9.8	2 10.4
Melbourne	2 0.1	2 6.7	3 1.1	2 4.7	2 4.1	2 3.9	2 7.3	2 9.6	2 10.1	2 8.9	2 6.5	2 6.7
Brisbane ..	2 3.9	2 6.8	2 11.7	2 6.4	2 7.4	2 9.8	2 7.9	3 1.6	3 3.8	3 4.2	3 0.8	3 1.7
Adelaide ..	2 3.1	2 4.7	3 2.0	2 6.3	2 7.6	2 7.3	2 6.5	2 11.5	2 11.5	2 11.7	2 8.1	2 9.1
Perth ..	2 11.0	3 2.1	3 1.7	3 1.2	3 1.3	2 11.4	2 9.5	2 11.0	3 1.3	3 0.6	2 11.0	2 8.4
Hobart ..	2 9.5	2 9.5	3 2.9	2 8.1	2 7.3	2 5.0	2 9.9	3 0.0	3 3.7	3 1.4	3 1.0	3 0.5
Tea, per lb.												
Sydney ..	1 3.9	1 3.0	1 3.0	1 3 9	1 3 9	1 3.9	1 3.9	1 3.9	1 3.9	1 3.9	1 3.9	1 4.0
Melbourne	1 3.8	1 3.0	1 3 0	1 3.0	1 3.0	1 3.0	1 3.0	1 3.0	1 3.0	1 3.0	1 3.0	1 2.7
Brisbane ..	1 10.4	1 8.9	1 6.4	1 6.3	1 6.6	1 6.3	1 7.4	1 7.0	1 6.3	1 7.0	1 6.8	1 4.3
Adelaide ..	1 2.3	1 2.3	1 2.3	1 2.3	1 2.3	1 2.3	1 2.3	1 2.8	1 2.3	1 3.1	1 3.3	1 4.4
Perth ..	1 1.6	1 2.1	1 2.1	1 2.1	1 2.1	1 2.1	1 2.5	1 2.6	1 2.6	1 3.6	1 3.6	1 8.8
Hobart ..	1 2 9	1 2.9	1 2.9	1 2.9	1 2.9	1 2.9	1 2.9	1 2.9	1 2.9	1 2.9	1 2.9	1 3.4
Coffee, per lb.												
Sydney ..	1 4.5	1 4.5	1 4.5	1 4.5	1 4.5	1 4.5	1 4.5	1 4.5	1 4.5	1 4.5	1 4.5	1 6.2
Melbourne	1 8.3	1 7.5	1 7.5	1 7.5	1 7.5	1 7.5	1 7.5	1 7.5	1 7.5	1 7.5	1 7.5	1 6.6
Brisbane ..	1 4.3	1 4.7	1 5.3	1 5.1	1 5.0	1 4.7	1 5.8	1 5.4	1 4.9	1 5.4	1 5.4	1 7.1
Adelaide ..	1 4.8	1 4.8	1 4.8	1 4.8	1 4.8	1 4.8	1 4 8	1 4.8	1 4.8	1 4.8	1 4.8	1 5.9
Perth ..	1 4.8	1 5.2	1 6.2	1 6.6	1 6.2	1 6.7	1 6.2	1 6.2	1 6.2	1 6.2	1 6.5	1 7.2
Hobart. ..	1 6.0	1 6.0	1 6.0	1 6.0	1 6.0	1 6 0	1 6.0	1 6.0	1 6.0	1 6.0	1 6.0	1 6.0
Sugar, per lb.												
Sydney ..	2.3	2.6	2.6	2.6	2.7	2.6	2.6	2.6	2.6	2.8	2.8	2.9
Melbourne	2.6	2 3	2.3	2.3	2.4	2.2	2.2	2.3	2.5	2.7	2 7	3 0
Brisbane ..	2 1	2 3	2 4	2.4	2.5	2.6	2.4	2.3	2.4	2.5	2.5	3.0
Adelaide ..	2.3	2.5	2 5	2.4	2.6	2.4	2.3	2.4	2.5	2.7	2.6	2.9
Perth ..	2.2	2.3	2.3	2.3	2 3	2.5	2.3	2.4	2.5	2.8	2.8	3.0
Hobart ..	2.5	2.6	2.6	2.5	2.6	2.5	2.5	2.5	2.5	2.6	2.7	3.0
Rice, per lb.												
Sydney ..	2.3	2.4	2.8	3.0	3.0	2 8	2.8	2.8	2.8	2.5	2.8	2.8
Melbourne	2.8	2.6	2.8	2.6	2 6	2.6	2.6	2.6	2.6	2.6	2.8	2.8
Brisbane ..	3.2	3.0	2.9	2.9	3.1	2 9	3.1	3.2	2.6	2.6	2.6	2.6
Adelaide ..	2.6	2.9	2.9	2.7	2.5	2 7	2.9	2.6	2.6	2.6	2.7	3.3
Perth ..	2.2	2.6	2.7	2.7	2 7	2.7	2.7	2.7	2.7	2.7	2.7	2.0
Hobart ..	3.0	3.0	3.0	3.0	2.9	3.0	3.0	2.9	2.8	2.7	2.9	3.0
Sago, per lb												
Sydney ..	2.5	2.6	3.0	2.7	2.7	3.7	4.0	3.7	2.5	2.5	2.5	3.0
Melbourne	2.2	2.6	2.3	2.1	2 3	3.1	3.7	2.5	2.5	2.5	2.9	2.9
Brisbane ..	2.9	2.8	2.5	2.4	2.4	2.9	3.2	2.9	2.3	2.3	2.5	2.8
Adelaide ..	2.1	2.4	2.3	2.3	2 2	3.2	3.4	2.7	2.2	2.3	2.6	3.2
Perth ..	2.6	2.9	3.1	3.1	2.9	3.3	3.4	3.2	3 2	2.9	2.8	3.0
Hobart ..	3.7	3.3	2.9	2.6	2.7	3.2	3.9	3.3	2.4	2.5	2.9	3.2

* First 9 months.

Retail Prices in Metropolitan Towns, 1901 to 1912—contd.

Town.	1901.	1902.	1903.	1904.	1905.	1906.	1907.	1908.	1909.	1910.	1911.	1912.*
Jam (Australian), per lb.												
	d.	d.	d.	d.	d.	d.	d.	d.	d.	d.	d.	d.
Sydney ..	3.6	3.6	4.1	3.6	4.1	4.1	3.8	3.8	3.6	3.6	4.0	4.4
Melbourne	3.8	4.0	3.9	4.0	3.9	4.1	4.0	3.9	3.8	4.0	4.0	4.0
Brisbane ..	4.4	4.3	4.2	3.8	3.8	3.8	3.8	3.9	3.8	3.9	3.8	3.9
Adelaide ..	3.3	3.4	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.4
Perth ..	4.2	4.1	4.0	3.9	3.9	3.9	3.9	3.8	3.9	3.9	4.0	4.1
Hobart ..	4.1	4.1	4.1	4.2	4.1	4.1	4.1	4.1	4.1	4.3	4.3	4.2
Oatmeal, per lb.												
Sydney ..	2.2	2.5	2.5	2.2	2.2	2.3	2.6	2.8	2.6	2.6	2.8	3.0
Melbourne	2.2	2.6	2.1	1.6	1.7	2.1	2.2	2.4	2.1	2.4	2.2	2.7
Brisbane ..	2.6	2.4	2.6	2.3	2.2	2.4	2.4	2.7	2.6	2.6	2.7	2.8
Adelaide ..	2.1	2.5	2.4	1.7	1.9	2.1	2.1	2.3	2.0	2.0	2.2	2.8
Perth ..	2.5	2.7	2.7	2.2	2.1	2.1	2.2	2.4	2.3	2.2	2.2	2.9
Hobart ..	2.0	2.2	2.3	1.6	1.7	2.0	2.1	2.3	2.2	2.1	2.0	2.8
Raisins, per lb.												
Sydney ..	6.2	6.9	7.0	6.0	5.9	5.3	4.8	7.2	5.9	6.5	6.0	6.2
Melbourne	7.7	6.4	6.3	5.5	6.0	6.3	6.4	6.4	6.2	6.5	6.5	6.3
Brisbane ..	7.4	6.2	5.4	5.4	5.3	5.3	6.0	6.2	6.6	6.6	6.6	6.4
Adelaide ..	6.5	6.3	6.3	6.1	6.1	6.6	6.3	6.3	6.3	6.5	6.5	6.2
Perth ..	7.5	8.2	7.5	7.7	7.4	7.5	7.6	7.4	7.4	7.2	7.4	6.4
Hobart ..	7.3	6.7	6.7	6.4	6.2	6.3	7.1	6.3	6.2	6.2	6.2	6.3
Currants, per lb.												
Sydney ..	6.6	5.6	5.6	5.2	5.7	5.9	6.2	6.6	6.6	6.6	6.9	7.3
Melbourne	6.6	5.6	5.3	5.3	5.4	5.6	6.2	6.7	6.6	6.8	6.8	7.1
Brisbane ..	7.8	6.5	5.8	5.7	5.6	5.5	6.5	6.7	7.0	7.0	7.0	7.2
Adelaide ..	7.1	6.8	6.1	5.7	5.7	6.3	6.4	6.8	7.2	7.2	7.2	6.7
Perth ..	6.5	6.0	5.5	6.0	6.1	6.2	6.7	6.6	6.6	6.7	7.0	7.0
Hobart ..	7.1	6.1	5.7	5.2	5.5	5.5	6.6	7.0	7.1	7.1	7.4	7.7
Starch, per lb.												
Sydney ..	3.8	3.5	4.8	5.5	5.0	5.4	5.5	5.5	5.5	6.0	6.0	5.6
Melbourne	4.8	5.3	5.1	4.9	4.7	4.9	4.8	4.8	5.0	5.0	5.0	5.3
Brisbane ..	5.6	5.5	5.3	5.3	5.3	5.2	5.4	5.3	5.3	5.3	5.4	5.5
Adelaide ..	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	5.5
Perth ..	4.8	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9
Hobart ..	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Blue, per dozen squares.												
Sydney ..	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9
Melbourne	5.1	6.0	6.0	6.0	6.0	6.0	6.0	6.2	6.4	6.3	6.4	6.6
Brisbane ..	8.6	8.8	8.7	7.7	7.9	7.3	7.4	7.6	7.9	8.0	7.9	8.3
Adelaide ..	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.3
Perth ..	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	10.6	10.6	10.6	10.9
Hobart ..	9.2	9.2	9.2	9.2	9.2	9.2	9.2	8.5	9.2	9.2	9.2	9.0
Candles, per lb.												
Sydney ..	5.6	5.6	5.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6
Melbourne	7.1	6.4	6.5	6.4	6.3	6.3	6.5	6.6	6.6	6.6	6.6	6.4
Brisbane ..	7.1	6.8	6.2	6.4	6.4	6.4	6.6	6.5	6.4	6.7	6.6	6.6
Adelaide ..	6.8	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.2	7.2	7.2	7.1
Perth ..	6.8	7.3	7.3	7.3	6.9	6.9	7.2	6.9	6.4	6.2	6.4	7.4
Hobart ..	4.6	4.6	4.6	4.6	4.6	4.6	4.8	5.3	5.4	5.4	5.4	5.9
Soap, per lb.												
Sydney ..	2.2	2.2	2.6	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	3.0
Melbourne	3.0	2.9	3.0	3.0	2.9	2.9	3.1	3.0	3.0	3.1	3.1	3.6
Brisbane ..	2.6	2.7	2.5	2.3	2.5	2.3	2.5	2.5	2.5	2.5	2.6	2.4
Adelaide ..	2.4	2.4	2.5	2.6	2.5	2.5	2.5	2.5	2.5	2.8	2.8	2.6
Perth ..	2.7	2.6	2.7	2.7	2.7	2.8	3.0	3.0	2.8	2.8	3.0	2.9
Hobart ..	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.7	2.7	2.7	3.2

* First 9 months.

Retail Prices in Metropolitan Towns, 1901 to 1912—contd.

TOWN	1901.	1902	1903.	1904.	1905.	1906.	1907.	1908.	1909.	1910.	1911.	1912.*
POTATOES, PER 14 LBS.												
	s. d.	s d.	s. d	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s d.	s	s. d
Sydney ..	11.3	11 3	8.3	6.0	1 3 8	1 3 8	6 8	10.9	10.9	11.3	11.3	1 6.9
Melbourne	8.5	10 5	8 3	6.1	1 0.9	1 1.7	7.5	9.6	8 9	11 3	10.0	1 1.9
Brisbane ..	1 0.8	1 0.1	7 6	6.8	1 2.3	1 3.6	10.7	1 2.1	1 1.8	1 2.7	1 4.9	1 9 9
Adelaide ..	1 0.9	1 1 3	8.8	8 0	1 1.4	1 1.9	9.1	10.7	11.7	11 9	11.4	1 4.3
Perth ..	1 5.8	1 5 5	1 3.3	1 4 4	1 7.7	1 7.7	1 3.7	1 4 5	1 4.0	1 5 5	2 8 3	1 9.8
Hobart ..	10.4	9.9	7.9	6.3	1 1.2	1 4.7	6.2	8 1	1 0.6	1 0.3	11.5	1 3 8
ONIONS, PER LB.												
Sydney ..	1.4	0.8	0.6	0 5	2.0	1.0	0.6	1.2	1.1	0.7	0.6	2.1
Melbourne	1.1	0.9	0.8	0.7	1.2	1.1	0 7	1.5	1.2	1.1	0.8	2.0
Brisbane ..	1.7	1.3	1.0	0.9	2.3	1.2	1 0	1.6	1.4	0.9	0.9	2.1
Adelaide .	1.9	1.2	1 0	1.0	2.2	1.3	1.0	1.4	1.5	1.2	1.3	2 3
Perth ..	2 0	2 0	1 5	1 7	2.5	1.7	1.7	1.8	1.9	1.6	1.6	2.4
Hobart ..	1.3	1 3	1.4	1.1	2.1	1 1	1.1	1.6	1 5	1.5	1.5	2.5
KEROSENE, PER GALLON.												
Sydney ..	10.1	10.1	10.1	10.8	10.1	10.1	10 1	11 8	11 8	11.8	11.8	1 0.8
Melbourne	10 0	9.6	10 5	10 5	10.6	11 5	11.7	11 0	11 3	11 2	11.3	1 0.3
Brisbane ..	1 8.9	1 3.7	1 1.4	1 1.6	1 1.7	1 1.9	1 3.3	1 2.1	1 2 2	1 2 0	1 1 9	1 0.5
Adelaide ..	1 4.5	1 0 1	1 0.7	1 0 7	1 0.2	1 0 3	1 1.3	1 0.7	1 1 0	1 1.0	1 0 8	1 2.0
Perth ..	1 0.2	11 6	1 1.2	11.5	11.1	11.5	1 0.6	11.6	11.6	11 7	1 0 3	1 0 5
Hobart .	1 4.3	1 2.4	1 1.3	1 0.6	1 0.7	1 1.3	1 1.8	1 2 3	1 1.9	1 2 2	1 1 8	1 2.7
MILK, PER QUART.												
Sydney ..	4.0	4 6	4.5	3.8	4 0	4.0	4.3	5.0	4 8	4.5	4.4	5.0
Melbourne	4.0	4 0	4 0	4.0	4 0	4.0	4.2	4.6	4.1	4.0	4.2	4.8
Brisbane ..	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	4 9	4.9	4.8
Adelaide ..	4 0	4 0	4.0	4.0	4.0	4.0	4 4	5.0	5 0	5 1	5.9	5.9
Perth .	5.9	5.9	6 4	5 9	5.9	5.9	5 9	6.4	6.4	6 4	6 4	6.9
Hobart. ..	4.1	4.1	4 3	4 3	4.4	4.4	4 6	4.4	4.6	4.6	4.8	5.0
BUTTER, PER LB.												
Sydney ..	1 0.2	1 4.4	1 2.2	10.2	1 1 0	1 1 2	1 1.0	1 3.4	1 2.4	1 1.5	1 1 7	1 3.6
Melbourne	1 2.8	1 5.4	1 2.5	1 0.2	1 2.0	1 1.7	1 2.3	1 4.3	1 2.9	1 2.4	1 1 7	1 4.2
Brisbane ..	11.9	1 3.6	1 2 0	9.9	11.8	1 0 0	11.7	1 3.0	1 1.3	1 0.7	1 1 0	1 3.0
Adelaide ..	1 4.0	1 5.2	1 1.6	11 2	1 1.2	1 1.2	1 0.7	1 3.6	1 2.2	1 1 3	1 2 0	1 5.8
Perth .	1 6.9	1 7 1	1 5 0	1 3 7	1 4 0	1 4 0	1 3 7	1 4.8	1 3.7	1 3 3	1 3.4	1 4.9
Hobart ..	1 1.6	1 2 1	1 0.7	10 8	1 0.7	1 0.6	1 0 8	1 2.9	1 2.1	1 1 9	1 1 2	1 4.2
CHEESE, PER LB.												
Sydney ..	7.8	10.0	9.5	7.6	9 5	9.0	10.3	1 0.0	10.7	9.8	9.5	11.7
Melbourne	9.2	10.4	10.4	10 5	9 9	10.4	9.9	10.7	10.3	10.5	9.9	11.1
Brisbane ..	10.0	10 8	10.9	9.2	9.9	8.8	9.8	11.0	10.9	10 4	10.6	11.2
Adelaide ..	10.9	10.4	10.2	10.4	10.4	10.1	10.3	10.4	10.5	10.7	10.7	11 5
Perth ..	10.3	10.8	1 0 3	11.5	11.3	10 4	10.4	11 2	10.7	10 4	10 2	11.9
Hobart ..	8.2	9.3	9.4	8.9	8.6	8 1	9.2	10.2	9.7	9.3	9.3	11.5
EGGS, PER DOZEN.												
Sydney ..	1 3.7	1 6 8	1 6.8	1 2 3	1 0.6	1 1 7	1 3.0	1 5.2	1 5 4	1 5 0	1 5.0	1 8.1
Melbourne	1 4.1	1 4 2	1 2.8	1 3 0	1 2.5	1 3 8	1 4.3	1 3.9	1 4.2	1 5.4	1 5.2	1 6.6
Brisbane ..	10.9	10.7	1 0.1	9.5	9.9	9.7	11 3	1 1.9	1 1 6	1 2.8	1 3 4	1 6.9
Adelaide ..	10.3	1 0 7	1 1.7	1 0.2	1 0 0	11.5	1 0 1	1 1.4	1 0 8	1 1.2	1 1 4	1 3.9
Perth ..	1 8.5	2 0 2	2 1.3	1 7.5	1 8 5	1 9.3	1 8.6	1 10.2	1 8 2	1 8.3	1 8.4	1 10.4
Hobart ..	1 1.1	1 2.3	1 4.3	1 1.2	1 2 5	1 4.0	1 1.7	1 3.4	1 4.8	1 1 0	1 2.8	1 5.6
BACON (Middle Cut), PER LB.												
Sydney ..	9.1	10.8	10.5	10.2	9.3	9 8	10.3	11.7	1 0.0	10.3	10.0	10 5
Melbourne	11.1	11.6	1 0.1	1 0.1	10.7	10 7	10 7	11.4	11.6	11 6	10.9	11 8
Brisbane ..	8.4	8.9	10.7	8 6	7.1	7.6	8 9	10.0	10.2	9.7	9 3	10.3
Adelaide ..	10.7	11.2	11.7	11 1	10.0	10.5	10 5	11.0	11.4	11.1	11.0	10.9
Perth ..	11.8	1 1.2	1 1.9	1 1 7	1 1 2	1 0.6	1 0.1	1 0.2	1 0.4	1 0.2	1 0.2	1 0 3
Hobart. ..	10.1	10.2	11.1	9 4	8 4	8.6	9.9	10.8	10.7	10.4	10.0	10.7

* First 9 months.

Retail Prices in Metropolitan Towns, 1901 to 1912—contd.

TOWN.	1901.	1902.	1903.	1904.	1905.	1906.	1907.	1908.	1909.	1910.	1911.	1912.*
BACON (Shoulder), PER LB.												
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Sydney ..	6.7	6.8	7.3	8.0	7.0	8.2	6.7	7.1	6.7	6.7	6.8	6.8
Melbourne	6.5	6.5	7.0	7.0	6.1	6.2	6.1	6.5	6.9	6.8	6.1	6.8
Brisbane ..	5.6	5.9	7.3	5.7	5.2	5.8	6.3	7.0	6.8	6.8	6.4	7.1
Adelaide ..	6.2	6.3	6.4	6.3	5.8	6.1	6.1	6.1	5.7	5.7	6.1	6.5
Perth ..	8.9	9.4	9.2	9.1	9.2	8.4	7.8	8.2	8.4	8.3	8.6	7.8
Hobart ..	7.0	7.2	7.3	6.1	5.6	5.8	6.8	7.4	7.5	7.2	6.8	6.8
HAM, PER LB.												
Sydney ..	11.0	1 0.2	1 0.7	1 0.0	11.3	11.9	1 0.3	1 1.5	1 1.3	1 0.5	1 0.6	11.5
Melbourne	11.7	11.7	1 0.4	1 0.2	10.7	10.7	10.7	11.2	11.7	1 0.0	11.0	1 0.2
Brisbane ..	11.7	11.9	1 1.4	11.8	10.8	11.2	1 0.0	1 0.7	1 1.2	1 0.7	1 0.7	1 2.1
Adelaide ..	11.7	1 0.5	1 1.3	1 0.8	1 0.0	1 0.8	1 0.4	1 0.9	1 1.0	1 0.9	1 0.8	11.7
Perth ..	1 0.7	1 2.6	1 3.1	1 2.8	1 1.5	1 2.0	1 0.9	1 1.1	1 1.6	1 1.4	1 1.4	1 1.4
Hobart ..	1 0.6	1 0.4	1 1.4	1 0.6	1 0.2	1 0.2	1 0.6	1 1.6	1 0.8	1 0.6	1 0.6	1 0.8
BEEF, FRESH, SIRLOIN, PER LB.												
Sydney ..	6.0	7.4	6.3	5.7	5.7	5.7	5.8	5.8	5.7	5.7	5.7	5.9
Melbourne	6.1	6.8	6.3	5.9	5.8	5.5	5.8	5.9	5.7	5.5	5.1	6.2
Brisbane ..	4.8	5.0	5.0	4.5	4.3	4.6	4.5	4.7	4.2	4.5	4.2	4.4
Adelaide ..	6.4	6.0	6.0	5.7	5.8	5.8	5.7	5.7	5.9	5.6	5.7	5.8
Perth ..	5.8	6.0	5.9	5.8	6.3	6.5	6.3	6.1	6.1	6.5	6.8	7.7
Hobart ..	6.1	6.9	6.7	6.5	6.5	6.4	6.3	6.4	6.4	6.4	6.4	6.4
BEEF, FRESH, RIB, PER LB.												
Sydney ..	4.7	6.1	5.0	4.5	4.5	4.5	4.6	4.6	4.5	4.5	4.5	4.7
Melbourne	5.2	5.8	5.1	4.7	4.6	4.6	4.9	5.0	4.8	4.6	4.2	5.0
Brisbane ..	4.1	4.3	4.1	3.9	3.7	4.1	3.9	4.1	3.4	3.7	3.7	3.3
Adelaide ..	5.4	5.0	5.0	4.8	4.9	4.9	5.0	5.0	4.9	4.7	4.7	4.8
Perth ..	5.5	5.8	6.1	5.4	5.7	6.1	5.7	5.6	5.7	6.0	6.3	6.6
Hobart ..	5.6	6.4	6.3	5.8	6.0	6.0	5.7	5.9	6.0	5.9	5.6	5.4
BEEF, FRESH, FLANK, PER LB.												
Sydney ..	3.6	4.7	3.9	3.4	3.4	3.4	3.5	3.5	3.4	3.4	3.4	3.9
Melbourne	4.5	5.2	4.5	4.0	4.0	3.9	4.2	4.4	4.2	3.9	3.6	4.0
Brisbane ..	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	4.6	3.7	4.6	3.4
Adelaide ..	4.1	4.1	4.0	4.0	4.0	4.0	4.1	4.1	3.9	3.8	3.8	4.2
Perth ..	5.9	6.9	7.2	6.3	6.8	7.0	6.0	6.5	6.6	6.9	7.3	6.1
Hobart ..	4.0	4.6	4.5	4.2	4.2	4.0	4.1	4.1	4.2	3.9	3.6	3.9
BEEF, FRESH, SHIN, PER LB.												
Sydney ..	3.3	4.3	3.5	3.0	3.0	3.0	3.2	3.2	3.0	3.0	3.0	3.4
Melbourne	3.9	4.4	3.8	3.6	3.5	3.4	3.8	3.9	3.7	3.4	3.1	3.6
Brisbane ..	3.5	3.3	3.1	3.1	3.1	3.1	3.0	2.9	2.4	2.7	2.7	3.0
Adelaide ..	3.9	3.6	3.5	3.4	3.5	3.5	3.5	3.5	3.0	3.4	3.4	3.7
Perth ..	4.9	5.7	5.7	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	5.9
Hobart ..	4.0	4.3	4.5	4.1	4.6	4.3	4.1	4.1	4.3	4.0	4.0	4.5
STEAK, RUMP, PER LB.												
Sydney ..	7.3	8.7	8.1	6.7	6.7	6.7	7.0	7.0	6.7	6.7	6.7	8.2
Melbourne	8.0	8.8	8.4	8.2	8.2	8.0	8.4	8.3	8.0	7.5	6.9	8.7
Brisbane ..	5.3	6.1	6.3	5.7	5.6	6.5	6.3	6.6	6.2	6.3	6.1	6.4
Adelaide ..	7.8	7.6	8.0	8.0	8.0	8.0	8.0	8.0	8.3	8.0	8.0	8.1
Perth ..	9.7	10.7	11.2	10.2	10.2	10.4	10.4	10.4	10.7	10.4	10.5	11.8
Hobart ..	8.0	8.6	8.6	8.1	8.4	8.3	8.4	8.0	8.4	8.1	8.1	8.4
STEAK, SHOULDER, PER LB.												
Sydney ..	4.1	5.0	4.3	3.4	3.4	3.4	3.6	3.6	3.4	3.4	3.4	4.1
Melbourne	4.6	5.2	4.5	4.3	4.2	4.2	4.5	4.4	4.2	4.1	3.9	4.4
Brisbane ..	3.7	4.2	4.3	3.7	3.6	4.1	4.2	4.5	3.8	3.7	3.5	3.8
Adelaide ..	5.4	5.0	5.0	4.9	4.9	5.0	4.5	4.4	4.5	4.1	4.4	4.5
Perth ..	5.6	6.3	7.2	6.3	7.1	7.5	7.0	6.5	6.9	7.3	7.3	7.2
Hobart ..	5.1	5.6	5.6	5.4	5.3	5.1	5.3	5.2	5.4	5.2	5.1	5.3

* First 9 months of 1912.

Retail Prices in Metropolitan Towns, 1901 to 1912—contd.

Town.	1901.	1902.	1903.	1904.	1905.	1906.	1907.	1908.	1909.	1910.	1911.	1912.*
STEAK, BUTTOCK, PER LB.												
	d.	d.	d.	d.	d.	d.	d.	d.	d.	d.	d.	d.
Sydney ..	4.2	5.2	4.4	3.5	3.5	3.5	3.7	3.7	3.5	3.5	3.5	4.2
Melbourne	5.1	5.8	5.1	4.9	4.8	4.7	5.1	4.9	4.7	4.6	4.3	5.0
Brisbane ..	4.1	4.3	4.5	3.8	3.7	4.0	4.1	4.3	4.2	3.8	3.6	3.7
Adelaide ..	5.2	4.9	4.9	4.9	4.9	5.0	4.9	4.7	4.9	4.7	4.7	4.9
Perth ..	4.6	5.4	5.7	4.7	5.5	5.6	5.3	4.8	5.1	5.5	5.5	7.2
Hobart ..	6.3	6.9	6.9	6.2	6.4	6.4	6.3	6.2	6.5	5.9	5.9	6.0
BEEF (Corned), ROUND, PER LB.												
Sydney ..	4.6	6.2	5.6	4.3	4.3	4.3	4.4	4.4	4.3	4.3	4.3	4.5
Melbourne	5.2	5.9	5.2	5.0	4.9	4.9	5.2	5.1	4.9	4.7	4.4	5.1
Brisbane ..	5.1	5.8	5.6	5.1	5.1	5.3	5.4	5.4	5.1	4.8	4.8	4.4
Adelaide ..	6.3	6.2	6.2	5.9	6.1	6.1	5.7	5.7	5.8	5.4	5.7	5.7
Perth ..	6.0	6.4	6.8	6.4	7.2	7.2	6.9	6.4	6.9	7.3	7.4	7.0
Hobart ..	5.7	6.0	6.0	5.7	5.9	5.7	5.6	5.7	5.8	5.7	5.7	5.9
BEEF (Corned), BRISKET WITH BONE, PER LB.												
Sydney ..	3.6	5.3	4.7	3.4	3.4	3.4	3.6	3.5	3.4	3.4	3.4	3.0
Melbourne	3.1	3.7	3.0	3.1	3.0	3.0	3.3	3.1	3.0	2.7	2.4	3.1
Brisbane ..	3.4	4.0	4.0	3.4	3.3	3.4	3.4	3.7	3.3	3.1	3.1	2.9
Adelaide ..	4.1	3.9	3.9	3.6	3.9	3.9	3.6	3.6	3.7	3.6	3.6	3.6
Perth ..	4.0	4.7	5.2	4.4	4.7	4.7	4.5	4.5	4.5	4.7	4.7	4.6
Hobart ..	4.2	4.7	4.9	4.3	4.5	4.3	4.3	4.3	4.5	4.2	4.0	3.5
BEEF (Corned), BRISKET WITHOUT BONE, PER LB.												
Sydney ..	4.7	6.3	5.8	4.4	4.4	4.4	4.6	4.6	4.4	4.4	4.4	3.9
Melbourne	4.3	4.9	4.2	4.1	4.0	3.9	4.2	4.1	3.9	3.7	3.6	4.1
Brisbane ..	4.0	4.5	4.5	3.7	4.0	4.2	4.0	4.0	4.0	4.0	4.0	3.9
Adelaide ..	5.5	5.3	5.3	5.0	5.3	5.3	4.7	4.7	4.7	4.7	4.2	4.5
Perth ..	5.3	6.2	6.5	5.7	6.2	6.2	6.0	5.7	5.8	6.2	6.5	6.0
Hobart ..	5.0	5.4	5.5	5.1	5.1	5.0	5.2	5.1	5.2	5.0	5.0	4.4
MUTTON, LEG, PER LB.												
Sydney ..	4.2	5.0	4.6	4.0	4.0	4.0	4.0	4.0	4.0	4.0	3.7	4.0
Melbourne	4.0	4.3	4.2	4.4	4.1	3.9	4.1	3.8	3.5	3.6	3.4	4.2
Brisbane ..	4.7	5.1	5.1	4.6	4.0	4.7	4.6	4.7	3.9	3.8	3.9	4.6
Adelaide ..	5.0	4.6	4.6	4.4	4.4	4.2	3.8	3.8	4.1	3.8	3.8	4.4
Perth ..	7.0	7.7	7.2	7.5	7.6	7.2	7.3	7.5	7.1	7.3	7.6	7.9
Hobart ..	4.9	5.4	5.2	5.4	5.2	5.3	5.4	5.2	5.6	5.5	4.7	5.3
MUTTON, SHOULDER, PER LB.												
Sydney ..	3.5	4.4	3.9	3.4	3.4	3.4	3.4	3.4	3.4	3.2	3.1	3.4
Melbourne	3.4	3.9	3.8	3.9	3.6	3.5	3.6	3.4	3.0	3.1	2.9	3.4
Brisbane ..	3.6	3.9	4.0	3.6	3.6	3.2	3.2	3.4	2.9	3.1	3.1	3.1
Adelaide ..	4.1	3.7	3.7	3.7	3.7	3.5	3.2	3.2	3.2	3.2	3.2	3.6
Perth ..	5.9	6.5	6.1	6.3	6.6	6.1	6.2	6.3	5.9	6.2	6.4	6.7
Hobart ..	4.0	4.4	4.5	4.4	4.5	4.4	4.5	4.1	4.4	4.5	4.2	4.4
MUTTON, LOIN, PER LB.												
Sydney ..	4.1	4.7	4.5	3.9	3.9	3.9	3.9	3.9	3.9	3.8	3.7	4.5
Melbourne	3.9	4.4	4.2	4.4	4.1	4.0	4.1	3.8	3.7	3.8	3.5	4.2
Brisbane ..	4.6	5.0	5.0	4.6	4.5	4.7	4.5	4.8	4.6	4.0	4.1	4.8
Adelaide ..	4.6	4.4	4.5	4.3	4.3	4.1	3.8	3.8	4.0	4.0	4.0	4.5
Perth ..	6.0	6.7	6.3	6.5	6.7	6.3	6.4	6.5	6.2	6.4	6.6	7·4
Hobart ..	5.5	5.9	6.0	5.6	5.6	5.8	5.7	5.7	6.2	6.2	5.3	5.1
MUTTON, NECK, PER LB.												
Sydney ..	3.4	4.1	3.8	3.3	3.3	3.3	3.3	3.3	3.3	3.1	3.0	3.6
Melbourne	3.2	3.6	3.5	3.7	3.3	3.3	3.4	3.0	2.8	3.0	2.6	3.0
Brisbane ..	4.3	4.6	4.8	4.3	4.2	4.3	4.4	4.4	4.2	3.7	3.7	4.3
Adelaide ..	3.7	3.5	3.5	3.3	3.4	3.3	3.1	3.1	3.1	3.1	3.1	3.4
Perth ..	5.1	5.7	5.2	5.5	5.7	5.2	5.3	5.5	5.1	5.3	5.6	5.9
Hobart ..	4.0	4.2	4.2	4.2	4.0	4.2	4.3	4.2	4.5	4.3	3.9	4.0

* First 9 months of 1912.

Retail Prices in Metropolitan Towns, 1901 to 1912—contd..

Town.	1901.	1902.	1903.	1904.	1905.	1906.	1907.	1908.	1909.	1910.	1911.	1912.*
Chops, Loin, per lb.												
	d.	d.	d.	d.	d.	d.	d.	d.	d.	d.	d.	d.
Sydney ..	4.4	5.5	4.8	4.3	4.3	4.3	4.3	4.3	4.3	4.1	4.0	5.4
Melbourne	5.0	5.5	5.4	5.3	5.0	4.8	5.0	4.7	4.3	4.5	3.9	5.2
Brisbane ..	4.9	5.4	5.7	5.0	4.8	4.9	4.9	5.1	4.9	4.3	4.3	5.1
Adelaide ..	5.5	5.2	4.9	4.7	4.9	4.9	4.7	4.7	4.7	4.4	4.4	5.1
Perth ..	6.3	7.3	7.0	7.2	7.5	7.0	7.1	6.9	6.9	7.1	7.3	8.0
Hobart ..	5.7	6.1	6.0	5.8	5.8	5.8	6.1	5.8	5.8	5.8	5.8	6.1
Chops, Leg, per lb.												
Sydney ..	4.1	5.4	4.7	4.2	4.2	4.2	4.2	4.2	4.2	4.1	3.9	4.7
Melbourne	4.5	4.9	4.8	4.8	4.5	4.3	4.3	4.2	3.9	4.0	3.8	4.7
Brisbane ..	4.9	5.4	5.4	5.0	4.9	4.9	4.9	5.1	4.9	4.3	4.3	5.1
Adelaide ..	5.7	5.4	5.1	4.9	5.1	5.1	4.9	4.9	4.9	4.6	4.6	5.3
Perth ..	6.5	7.6	7.3	7.5	7.7	7.3	7.6	7.1	7.1	7.4	7.4	8.1
Hobart ..	5.2	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.3	6.0
Chops, Neck, per lb.												
Sydney ..	3.6	3.9	3.7	3.2	3.2	3.2	3.2	3.2	3.2	3.1	3.0	4.1
Melbourne	3.2	3.6	3.4	3.4	3.1	2.9	3.0	2.9	2.9	2.9	3.0	3.5
Brisbane ..	5.0	5.5	5.6	5.2	5.0	5.1	5.1	5.3	5.1	4.5	4.4	5.1
Adelaide ..	4.3	4.1	3.8	3.6	3.8	3.8	3.6	3.6	3.6	3.5	3.5	4.3
Perth ..	6.0	7.2	6.8	7.1	7.4	6.8	7.1	6.7	6.7	7.2	7.2	6.7
Hobart ..	4.7	5.0	4.9	4.9	4.9	4.9	5.0	4.9	4.9	5.1	4.9	4.8
Pork, Leg, per lb.												
Sydney ..	7.0	6.7	6.7	6.7	6.7	6.7	7.4	7.9	8.1	8.6	8.6	7.8
Melbourne	5.4	6.4	6.2	5.7	5.2	5.0	5.5	5.5	6.2	5.7	5.2	6.4
Brisbane ..	5.8	6.4	7.0	6.0	5.8	5.9	5.4	5.4	5.8	5.8	6.3	7.0
Adelaide ..	7.3	7.3	7.0	6.9	7.0	6.6	5.9	6.4	6.4	6.4	6.4	7.1
Perth ..	7.9	8.1	7.9	8.1	8.4	8.4	8.5	8.7	8.6	8.1	8.1	8.9
Hobart ..	6.4	6.2	6.3	6.2	6.0	6.1	6.5	6.3	6.0	6.5	6.1	6.2
Pork, Loin, per lb.												
Sydney ..	6.0	6.0	6.0	6.0	6.0	6.0	6.8	7.3	7.5	8.0	8.0	8.2
Melbourne	6.4	7.4	7.0	6.6	6.0	6.0	6.4	6.6	7.0	6.5	6.0	7.1
Brisbane ..	6.3	6.9	7.5	7.0	6.4	6.6	6.4	6.6	6.8	6.8	7.3	7.2
Adelaide ..	7.7	7.7	7.3	7.2	7.3	6.9	6.7	7.2	7.2	7.2	7.2	7.9
Perth ..	6.9	7.2	6.9	7.2	7.4	7.4	7.9	7.8	7.7	7.2	7.2	9.0
Hobart ..	6.6	6.6	6.9	6.8	6.6	6.6	6.6	6.9	6.6	6.6	6.7	6.5
Pork, Belly, per lb.												
Sydney ..	5.6	5.9	5.9	5.9	5.9	5.9	6.5	7.1	7.3	7.5	7.5	7.6
Melbourne	6.2	7.3	7.0	6.6	6.1	6.0	6.4	6.6	7.0	6.5	6.1	6.9
Brisbane ..	5.0	5.5	6.0	5.7	5.5	5.1	5.2	5.4	5.7	5.5	6.5	6.0
Adelaide ..	7.6	7.6	7.2	7.1	7.2	6.9	6.6	7.1	7.1	7.1	7.1	7.8
Perth ..	7.0	7.3	7.0	7.3	7.5	7.5	7.9	7.8	7.6	7.1	7.1	8.1
Hobart ..	6.7	7.0	6.7	6.9	6.6	6.9	6.9	6.7	6.5	6.6	6.7	6.5
Pork, Chops, per lb.												
Sydney ..	7.0	6.7	6.7	6.7	6.7	6.7	7.4	7.9	8.1	8.6	8.6	8.7
Melbourne	7.0	8.1	7.6	7.2	6.6	6.4	7.0	7.2	7.6	7.1	6.6	7.3
Brisbane ..	6.7	7.3	8.1	7.0	6.7	6.8	6.6	6.8	7.0	7.2	7.7	7.9
Adelaide ..	8.0	8.0	7.8	7.8	7.8	7.3	6.8	7.3	7.3	7.3	7.3	8.0
Perth ..	8.6	8.7	8.5	8.7	9.0	9.0	9.1	9.4	9.3	8.7	8.7	9.6
Hobart ..	7.4	7.5	7.4	6.8	6.7	6.8	7.1	6.9	7.2	6.8	6.8	7.0

* First 9 months of 1912.

APPENDIX III.

Current Retail Prices in Metropolitan and Country Towns, 1912.*

TOWN.	Bread 2 lbs.	Flour 25 lbs.	Tea per lb.	Coffee per lb	Sugar per lb.	Rice per lb	Sago per lb.	Jam per lb.	Oatmeal per lb.	Raisins per lb.	Currants per lb.	Starch per lb.
	d.	s. d.	s. d.	s. d.	d.	d.	d.	d.	d.	d.	d.	d.
Sydney ..	3.3	2 10.4	1 4.0	1 6.2	2.8	2.8	3.0	4.4	3.0	6.2	7.3	5.6
Newcastle	3.0	2 11.0	1 5.4	1 5.6	2.9	3.2	3.2	4.4	2.9	7.0	7.5	5.6
Broken Hill	3.5	2 11.7	1 6.2	1 7.8	3.3	4.0	4.1	4.5	3.5	7.1	7.4	6.9
Goulburn ..	3.2	2 9.9	1 5.9	1 6.6	3.0	3.1	3.7	4.6	3.1	7.6	7.7	6.0
Bathurst ..	3.5	2 6.7	1 5.8	1 6.0	3.1	3.0	3.4	4.9	3.0	7.2	7.1	6.1
Melbourne	3.0	2 6.7	1 2.7	1 6.6	3.0	2.8	2.9	4.0	2.7	6.3	7.1	5.3
Ballarat ..	3.1	2 6.4	1 3.0	1 5.9	3.0	2.9	2.9	3.6	2.7	5.8	6.7	5.4
Bendigo ..	3.2	2 6.0	1 2.2	1 6.1	3.2	2.9	3.0	3.5	2.8	5.8	7.0	5.3
Geelong ..	3.2	2 9.4	1 2.6	1 5.2	3.0	2.6	3.0	3.7	2.9	6.2	7.5	5.1
Warrnambool	3.3	2 8.3	1 3.2	1 6.1	2.9	2.7	3.0	3.8	2.8	6.3	6.9	5.8
Brisbane ..	3.5	3 1.7	1 4.3	1 7.1	3.0	2.6	2.8	3.9	2.8	6.4	7.2	5.5
Toowoomba	3.5	3 4.0	1 6.0	1 5.9	3.1	3.0	3.2	4.8	3.0	7.1	7.7	6.0
Rockhampt'n	3.8	3 0.9	1 6.0	1 6.6	2.8	2.8	3.0	4.4	2.9	6.2	7.0	6.0
Charters Towers	4.5	3 7.2	1 7.6	1 7.8	3.5	3.7	4.0	4.8	3.3	6.8	7.7	6.0
Warwick ..	3.7	3 3.9	1 6.1	1 6.0	3.1	3.0	3.4	4.8	3.1	8.2	7.6	6.0
Adelaide ..	3.5	2 9.1	1 4.4	1 5.9	2.9	3.3	3.2	3.4	2.8	6.2	6.7	5.5
Kadina Moonta & Wallaroo ..	3.3	2 6.1	1 3.4	1 6.2	2.9	3.1	3.1	3.5	2.8	6.6	6.6	5.9
Port Pirie	3.0	2 9.1	1 6.0	1 7.9	3.3	3.4	3.7	3.9	3.1	7.1	7.5	6.2
Mt. Gambier	3.0	2 9.9	1 4.2	1 7.7	3.0	3.0	3.2	4.0	2.9	6.6	7.1	5.7
Petersburg	3.4	2 11.2	1 5.6	1 7.5	3.2	3.5	3.0	4.2	3.0	7.4	6.9	6.2
Perth and Fremantle	3.5	2 8.4	1 3.8	1 7.2	3.0	2.9	3.0	4.1	2.9	6.4	7.0	5.9
Kalgoorlie & Boulder	5.0	3 3.1	1 7.3	1 9.4	3.8	3.9	4.0	5.2	3.4	9.3	8.1	7.0
Mid. Junction & Guildford	3.5	2 9.0	1 3.8	1 6.0	3.0	2.9	3.0	4.0	3.0	6.0	7.3	6.0
Bunbury ..	3.5	2 10.6	1 3.7	1 6.0	3.2	3.1	3.1	4.2	2.9	6.7	7.3	6.1
Geraldton	4.0	2 11.1	1 5.4	1 3.4	3.3	3.0	4.0	4.3	3.0	7.8	7.9	6.0
Hobart ..	3.5	3 0.5	1 3.4	1 6.0	3.0	3.0	3.2	4.2	2.8	6.3	7.7	6.0
Launceston	3.3	2 7.4	1 2.5	1 5.2	2.7	2.9	2.8	3.9	2.5	6.1	7.1	5.4
Zeehan ..	3.7	2 11.3	1 4.2	1 6.1	3.0	3.0	3.2	4.2	2.9	6.6	7.1	5.5
Beaconsfield	3.2	2 10.6	1 2.8	1 5.8	3.0	3.0	3.4	4.3	2.8	7.5	7.1	5.9
Queenstown	3.7	3 0.2	1 5.6	1 4.7	2.9	3.0	3.1	4.0	2.7	7.6	7.8	5.7
Weighted Average ..	**3.3**	**2 9.4**	**1 3.8**	**1 6.4**	**3.0**	**2.9**	**3.0**	**4.1**	**2.8**	**6.4**	**7.2**	**5.6**

* Average prices for first 9 months only.

Current Retail Prices in Metropolitan and Country Towns, 1912.*—contd.

Town.	Blue. dz. sq.		Candle per lb.	Soap per lb.	Potatoes. 14 lbs.		Onions per lb.	Kerosene gallon		Milk quart	Butter per lb.		Cheese per lb.		Eggs per dz		Bacon Middle per lb.		Bacon Shoulder. per lb.
	s.	d.	d.	d.	s.	d.	d.	s.	d.	d.	s.	d.	s.	d.	s.	d.	s.	d.	d.
Sydney ..		8.9	6.6	3.0	1	6.9	2.1	1	0.8	5.0	1	3.6		11.7	1	8.1		10.5	6.8
Newcastle		10.0	7.0	3.6	1	7.5	2.5	1	2.1	4.3	1	3.7		11.7	1	8.3		10.8	9.5
Broken Hill	1	0.7	8.5	3.2	1	8.8	2.8	1	9.6	6.2	1	8.3	1	0.5	1	6.4		11.3	9.1
Goulburn ..		11.2	6.4	3.2	1	3.7	2.6	1	3.2	4.9	1	3.9		11.5	1	5.9		10.6	7.8
Bathurst ..		11.2	7.3	2.9	1	2.4	2.3	1	5.3	4.4	1	3.7		11.7	1	5.9		11.4	9.0
Melbourne		6.6	6.4	3.6	1	1.9	2.0	1	0.3	4.8	1	4.2		11.1	1	6.6		11.8	6.8
Ballarat ..		6.3	5.9	2.9		11.9	2.0	1	1.5	3.9	1	3.1		10.9	1	2.9		11.5	6.9
Bendigo ..		6.4	6.6	3.1	1	3.3	2.1	1	2.5	4.8	1	3.6		11.3	1	3.7		10.2	6.2
Geelong ..		6.3	6.0	3.0	1	1.6	1.9	1	2.6	4.5	1	3.4		10.7	1	4.4		11.3	6.9
Warrnambool		7.1	6.2	2.9	1	1.3	1.7	1	1.3	4.0	1	4.2		10.6	1	3.2		10.4	6.8
Brisbane ..		8.3	6.6	2.4	1	9.9	2.1	1	0.5	4.8	1	3.0		11.2	1	6.9		10.3	7.1
Toowoomba		10.0	7.2	3.0	1	10.6	2.4	1	4.9	4.2	1	3.4		11.0	1	5.7		9.9	7.5
Rockhampt'n		9.5	6.9	2.5	1	9.8	2.3	1	1.5	4.9	1	2.5		11.8	1	7.3		9.3	7.6
Charters Towers		10.3	7.8	2.8	2	4.3	2.9	1	6.3	4.8	1	5.5	1	0.7	1	9.3		11.5	8.8
Warwick ..		11.6	7.3	2.9	1	9.6	2.7	1	6.0	4.2	1	3.6		10.9	1	4.6		10.0	8.4
Adelaide ..		9.3	7.1	2.6	1	4.3	2.3	1	2.0	5.9	1	5.8		11.5	1	3.9		10.9	6.5
Kadina Moonta & Wallaroo ..		9.6	7.3	3.1	1	4.8	2.5	1	3.2	6.0	1	5.2		11.6	1	2.0		10.7	9.2
Port Pirie		11.6	8.5	2.5	1	5.3	2.6	1	4.1	5.8	1	5.9	1	0.8	1	2.8		11.7	9.3
Mt. Gambier		11.4	7.8	3.0	1	1.9	2.2	1	3.8	3.4	1	2.5		10.1	1	0.1		10.6	8.1
Petersburg		11.7	7.9	3.5	1	5.4	2.8	1	5.0	4.4	1	4.4		11.6	1	2.0		11.5	9.8
Perth and Fremantle		10.9	7.4	2.0	1	9.8	2.4	1	0.5	6.9	1	4.9		11.9	1	10.4	1	0.3	7.8
Kalgoorlie & Boulder	1	0.0	9.5	4.3	2	3.6	3.3	1	9.7	9.0	1	7.3	1	1.5	2	2.4	1	1.7	9.0
Mid. Junction & Guildford		10.8	8.2	3.1	2	0.0	2.7	1	0.5	6.0	1	5.5	1	0.1	1	10.1	1	0.3	8.7
Bunbury ..		11.2	8.5	2.7	1	10.7	2.8	1	1.0	5.5	1	5.7	1	0.1	1	8.9	1	0.0	8.4
Geraldton	1	0.0	8.7	2.7	2	1.0	2.4	1	2.3	6.0	1	7.0	1	0.9	1	11.7	1	1.3	9.6
Hobart ..		9.0	5.9	3.2	1	3.8	2.5	1	2.7	5.0	1	4.2		11.5	1	5.6		10.7	6.8
Launceston		7.3	5.7	2.8	1	3.7	2.2	1	3.4	4.6	1	3.3		10.5	1	4.0		10.0	7.7
Zeehan ..		9.1	7.0	3.1	1	7.3	2.3	1	3.2	5.6	1	6.0		11.5	1	7.2		10.0	7.8
Beaconsfield		9.4	7.2	4.2	1	4.0	2.5	1	3.4	4.8	1	4.1		10.9	1	4.8		9.7	8.2
Queenstown		8.7	7.7	3.3	1	6.4	2.1	1	5.4	5.6	1	4.3		10.6	1	7.2		10.0	8.2
Weighted Average ..		**8.4**	**6.7**	**3.1**	**1**	**5.4**	**2.2**	**1**	**1.4**	**5.1**	**1**	**4.2**		**11.5**	**1**	**6.9**		**11.1**	**7.1**

* Average prices for first 9 months only.

Current Retail Prices in Metropolitan and Country Towns, 1912.*—contd.

TOWN.	Ham	Beef Fresh Sirloin	Beef Fresh Rib	Beef Fresh Flank	Beef Fresh Shin	Steak Rump	Steak sh'lder	Steak But-tock	Beef Co'n'd round	Beef Co'n'd brisket with bone	Beef Co'n'd brisket without bone	Mutt'n Leg
	per lb.	per lb.	per lb.	per lb.	per lb.	per lb	per lb.	per lb.	per lb.	per lb.	per lb.	per lb.
	s. d.	d.	d.	d.	d.	s. d.	d.	d.	d.	d.	d.	d.
Sydney ..	11.5	5.9	4.7	3.9	3.4	8.2	4.1	4.2	4.5	3.0	3.9	4.0
Newcastle	11.9	5.7	5.0	3.9	3.8	7.3	4.3	4.4	4.7	3.6	5.0	4.9
Broken Hill	1 0.6	6.6	5.6	3.9	5.2	10.0	6.2	6.6	6.6	4.2	5.6	6.1
Goulburn ..	11.5	5.2	4.2	3.8	3.5	6.1	4.2	4.2	5.2	3 9	4.8	4.2
Bathurst ..	1 0.6	4.4	3.9	3.2	3.3	5.9	3.8	4.0	4.1	3.3	3.8	4.1
Melbourne	1 0.2	6.2	5.0	4.0	3.6	8.7	4.4	5 0	5.1	3.1	4.1	4.2
Ballarat ..	1 0.2	7.0	6.1	4.9	4.4	9.7	5.6	5.9	6.9	4.2	5.9	4.9
Bendigo ..	11.3	5.6	5.2	3.6	4.2	8.0	5.0	5.3	5.3	3.5	4.7	4.8
Geelong ..	11.8	5.8	5.4	4.0	3.8	7.8	4.3	5.2	5.5	3.3	4.4	4.4
Warrnambool	11.1	5.5	4.8	3.3	4.1	6.9	4.0	4 8	4.9	3.1	4.0	4.9
Brisbane ..	1 2.1	4.4	3.3	3.4	3.0	6.4	3.8	3.7	4.4	2.9	3.9	4.6
Toowoomba	1 2 4	4.9	3.1	2.1	2.5	5.8	2 9	2.9	4.4	2.5	3.9	4.5
Rockhampt'n	1 2.9	5.7	4.8	3.4	2.9	5.9	4 0	3.7	5 0	3.9	4.6	5.3
Charters Towers	1 3.8	5.0	3.5	3.5	4.0	6.0	4.0	4.0	4.5	3.5	4.5	5.5
Warwick ..	1 2.5	5.0	4.0	4.0	4.0	5.0	4.0	4.0	5.0	4.0	4.4	5.0
Adelaide ..	11.7	5.8	4.8	4.2	3.7	8.1	4.5	4.9	5.7	3.6	4.5	4.4
Kadina Moonta & Wallaroo ..	11.4	5.6	5.4	3.9	4.5	7.0	5.4	5.4	5.6	4.2	5.0	4.6
Port Pirie	1 0.7	5.9	4.9	3.1	4.4	7.9	5.4	5.6	6.0	4.0	4.9	4.9
Mt. Gambier	11.8	5.2	4.6	3.6	4.0	5.9	4.0	4.0	5.2	4.0	5.0	4.1
Petersburg	1 0.9	5.3	5.0	4.8	4.7	7.1	5.0	5.0	5.5	4.1	4.9	4.9
Perth and Fremantle	1 1.4	7.7	6.6	6.1	5.9	11.8	7 2	7.2	7.0	4.6	6.0	7.9
Kalgoorlie & Boulder	1 4.6	8.9	7.8	6.8	8.7	11.9	8.6	8.7	8.7	6.3	8.1	8.9
Mid. Junction & Guildford	1 1.4	8.3	7.5	4.9	7.0	1 0.5	8.0	7.8	7.6	5.4	6.6	8.3
Bunbury ..	1 1.0	9.0	8.0	5.7	7.2	1 0.0	8.1	8.1	8.3	6.1	7.3	9.0
Geraldton	1 2.5	7.6	6.6	4.9	6.3	9.1	6.9	7.2	7.2	5.7	6.4	7.6
Hobart ..	1 0.8	6.4	5.4	3.9	4.5	8.4	5.3	6.0	5.9	3.5	4.4	5.9
Launceston	11.8	6.1	5.5	3.8	4.8	7.0	5.2	5.7	5.7	3.8	5.2	5.2
Zeehan ..	11.4	6.8	6.6	5.4	5.9	8.0	6.4	6.8	6.8	5.8	6.5	6.9
Beaconsfield	1 0.0	6.2	5.6	4.4	5.5	6.9	6.1	6.1	5.4	4.3	5.3	5.4
Queenstown	11.9	7.0	6.5	4.5	5.7	8.2	6.5	6.9	6.8	4.7	5.7	6.6
Weighted Average ..	**1 0.1**	**6.0**	**4.9**	**4.1**	**3.8**	**8.4**	**4.6**	**4.9**	**5.2**	**3.4**	**4.4**	**4.6**

* Average prices for first 9 months only.

Current Retail Prices in Metropolitan and Country Towns, 1912.*—contd.

Town.	Mutt'n sh'ld'r per lb.	Mutt'n Loin per lb	Mutt'n Neck per lb.	Chops Loin per lb.	Chops Leg per lb.	Chops Neck per lb.	Pork Leg per lb.	Pork Loin per lb.	Pork Belly per lb.	Pork Chops per lb.
	d.	d.	d.	d.	d.	d.	d.	d.	d.	d.
Sydney ..	3.4	4.5	3.6	5.4	4.7	4.1	7.8	8.2	7.6	8.7
Newcastle	4.1	4.7	4.0	4.9	5.1	4.3	6.4	7.7	6.3	7.8
Broken Hill	5.1	5.5	4.4	6.3	6.3	5.8	9.1	9.1	8.3	9.9
Goulburn ..	3.6	4.2	2.9	4.2	4.2	3.0	5.8	6.0	5.6	6.0
Bathurst ..	3.5	4.0	2.8	4.1	4.2	3.6	5.8	6.1	5.9	6.2
Melbourne	3.4	4.2	3.0	5.2	4.7	3.5	6.4	7.1	6.9	7.3
Ballarat ..	4.0	5.1	3.5	5.5	5.9	4.3	7.3	8.1	8.3	8.2
Bendigo ..	3.5	4.7	3.3	5.3	5.3	4.2	6.3	6.6	6.6	7.0
Geelong ..	3.6	4.5	3.5	4.8	4.8	3.8	6.6	7.2	7.1	7.4
Warrnambool	4.0	4.9	3.6	5.1	5.0	4.0	6.0	6.3	6.1	6.5
Brisbane ..	3.1	4.8	4.3	5.1	5.1	5.1	7.0	7.2	6.0	7.9
Toowoomba	2.8	4.5	3.7	4.9	4.9	4.9	6.1	6.1	5.8	6.3
Rockhampt'n	3.9	5.3	4.0	5.4	5.3	5.2	7.3	7.3	6.4	7.4
Charters Towers	4.0	5.6	3.9	6.0	6.0	5.3	8.0	8.0	6.9	8.0
Warwick ..	4.1	5.0	4.7	5.0	5.0	4.9	7.0	7.0	7.0	7.0
Adelaide ..	3.6	4.5	3.4	5.1	5.3	4.3	7.1	7.9	7.8	8.0
Kadina Moonta & Wallaroo ..	3.5	4.2	3.3	4.5	5.4	4.3	6.5	6.5	6.1	6.8
Port Pirie	4.1	4.5	4.2	5.7	5.9	5.3	6.2	6.1	6.1	6.4
Mt. Gambier	4.0	4.6	3.5	4.9	5.0	4.4	6.0	6.1	6.1	6.1
Petersburg	4.1	4.7	3.7	5.4	5.8	4.7	6.0	6.0	5.8	6.0
Perth and Fremantle	6.7	7.4	5.9	8.0	8.1	6.7	8.9	9.0	8.1	9.6
Kalgoorlie & Boulder	7.3	8.4	7.0	8.7	9.0	8.3	10.7	10.5	9.2	11.6
Mid Junction & Guildford	7.3	7.5	5.9	8.4	8.4	7.0	8.7	8.7	8.0	8.9
Bunbury ..	8.0	8.7	7.1	9.0	9.0	7.8	9.0	9.0	9.0	9.4
Geraldton	6.6	6.8	5.8	7.6	7.6	6.9	8.0	8.0	6.5	8.0
Hobart ..	4.4	5.1	4.0	6.1	6.0	4.8	6.2	6.5	6.5	7.0
Launceston	4.8	5.1	3.9	6.0	5.9	5.0	6.1	6.3	6.3	6.5
Zeehan ..	6.0	6.8	5.7	6.9	7.0	6.1	7.5	7.5	7.1	7.8
Beaconsfield	5.1	5.3	4.2	6.2	6.1	5.9	6.2	6.2	6.2	6.5
Queenstown	6.3	6.3	5.6	6.9	7.0	6.3	7.0	7.0	7.0	7.1
Weighted Average ..	**3.8**	**4.7**	**3.7**	**5.5**	**5.2**	**4.3**	**7.2**	**7.7**	**7.2**	**8.0**

* Average prices for first 9 months only.

APPENDIX IV.

Weekly House Rents† in Metropolitan Towns, 1901 to 1912.*

TOWN.	1901.		1902.		1903.		1904		1905.		1906.		1907.		1908.		1909.		1910.		1911.		1912*	
Sydney	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Under 4 Rooms	9	0	9	0	9	0	9	0	9	0	9	2	9	2	9	5	10	2	10	5	11	4	11	5
4 ,,	11	1	11	1	11	1	11	3	11	5	11	7	11	10	12	1	12	9	13	3	14	5	15	0
5 ,,	13	7	13	7	13	8	13	10	13	11	14	0	14	8	14	8	14	10	15	4	17	1	17	10
6 ,,	15	4	15	4	15	4	15	4	16	9	16	9	16	11	17	5	18	3	18	7	20	2	21	6
7 ,,	19	1	19	1	19	1	19	1	19	1	19	1	19	5	19	5	20	0	20	11	23	3	26	0
Over 7 ,,	22	2	22	2	22	2	22	2	22	6	22	6	22	9	22	9	23	0	24	3	26	10	31	9
Weighted Av'ge	14	4	14	4	14	4	14	5	14	10	14	10	15	2	15	5	15	11	16	5	18	1	19	5
Melbourne																								
Under 4 Rooms	6	0	6	3	6	5	6	7	6	7	6	8	6	11	7	2	7	2	7	7	8	3	8	9
4 ,,	7	11	8	2	8	3	8	6	8	6	8	7	8	11	9	2	9	4	10	7	11	3	11	7
5 ,,	10	3	10	6	10	8	11	0	11	0	11	1	11	6	12	2	12	3	13	6	14	4	14	5
6 ,,	13	2	13	3	13	1	13	4	13	9	13	11	14	3	14	8	14	10	16	4	17	1	18	0
7 ,,	15	8	15	9	15	11	16	0	16	3	16	9	17	3	17	4	17	9	19	5	20	7	21	5
Over 7 ,,	20	1	20	2	20	0	20	7	20	5	20	10	21	3	21	5	22	0	22	6	24	1	25	2
Weighted Av'ge	11	5	11	7	11	8	11	11	12	0	12	3	12	7	12	11	13	2	14	4	15	2	15	8
Brisbane																								
Under 4 Rooms	3	0	3	0	3	0	3	3	3	4	3	8	4	0	4	4	4	7	4	11	5	5	6	1
4 ,,	4	6	4	6	4	6	4	9	4	9	5	4	5	4	5	10	6	4	6	4	6	11	8	1
5 ,,	5	6	5	6	5	6	5	9	5	11	6	4	7	0	7	7	8	2	8	5	9	4	10	4
6 ,,	7	8	7	11	8	7	8	7	8	10	8	0	9	2	9	11	10	9	11	8	13	2	13	9
7 ,,	11	4	11	4	11	10	11	4	11	7	11	10	13	1	13	7	14	5	15	7	16	7	16	11
Over 7 ,,	14	11	14	11	14	11	14	7	14	9	14	10	16	2	17	3	18	4	19	6	20	10	23	0
Weighted Av'ge	7	8	7	8	7	11	7	11	8	1	8	2	9	0	9	7	10	4	10	11	12	0	12	7
Adelaide																								
Under 4 Rooms	4	9	4	9	4	9	4	9	5	5	6	2	6	7	7	3	8	0	8	10	9	7	9	11
4 ,,	7	6	7	6	7	6	7	6	8	9	9	1	9	9	10	9	11	5	12	4	13	8	14	1
5 ,,	9	7	9	7	9	7	9	7	10	11	12	1	12	11	13	11	14	10	16	4	17	8	18	8
6 ,,	12	2	12	2	12	2	12	2	13	4	14	4	15	7	16	7	18	4	19	4	21	2	22	2
7 ,,	14	4	14	4	14	4	14	4	15	4	16	8	17	5	18	7	20	3	22	2	23	9	25	9
Over 7 ,,	16	11	16	11	17	1	17	1	18	4	19	10	20	10	21	9	22	8	24	5	27	3	29	8
Weighted Av'ge	9	10	9	10	9	10	9	10	10	11	11	11	12	8	13	7	14	8	15	11	17	4	18	3
Perth																								
Under 4 Rooms	8	7	8	7	8	8	8	6	7	8	7	0	7	0	6	11	6	8	7	4	8	7	8	8
4 ,,	10	11	10	10	10	11	10	11	10	2	9	10	9	7	9	4	9	3	9	4	10	10	11	5
5 ,,	12	4	12	1	12	4	12	4	11	7	11	6	11	0	10	11	11	1	11	4	12	10	14	3
6 ,,	16	7	16	7	16	7	16	5	15	2	14	7	13	4	13	6	12	10	14	1	16	8	17	2
7 ,,	18	5	18	5	18	3	18	3	16	6	16	6	14	10	14	10	14	3	15	4	18	3	20	11
Over 7 ,,	19	7	19	7	19	9	19	9	18	2	18	0	17	2	17	3	17	3	17	3	20	7	27	0
Weighted Av'ge	12	6	12	5	12	6	12	6	11	7	11	3	10	8	10	7	10	5	10	10	12	8	13	7
Hobart																								
Under 4 Rooms	5	2	5	2	5	5	5	7	5	7	5	10	5	11	6	1	6	1	6	8	7	7	7	3
4 ,,	8	0	8	0	8	0	8	0	8	0	8	1	8	3	8	6	8	11	9	3	9	5	9	9
5 ,,	9	3	9	3	9	5	9	5	9	10	9	11	10	5	10	8	11	2	11	6	11	10	11	10
6 ,,	10	11	11	0	11	0	11	0	11	0	11	1	11	5	11	11	12	6	12	10	13	7	14	3
7 ,,	14	7	14	9	14	9	14	9	15	0	15	0	15	7	15	8	15	11	16	2	16	11	17	6
Over 7 ,,	16	4	16	4	16	4	16	4	16	4	16	4	16	10	17	3	17	3	17	11	18	2	20	8
Weighted Av'ge	10	5	10	5	10	6	10	6	10	8	10	9	11	1	11	4	11	8	12	1	12	7	12	10

* For the first 9 months. † The rents are shewn to the nearest penny.

APPENDIX V.

Current Weekly House Rents† in Metropolitan and Country Towns, 1912.*

Town.	Average Predominant Weekly Rents for Houses having—													
	Under 4 Rooms.		4 Rooms.		5 Rooms.		6 Rooms.		7 Rooms.		Over 7 Rooms.		Weighted Average for all Houses.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Sydney	11	5	15	0	17	10	21	6	26	0	31	9	19	5
Newcastle ..	5	8	7	5	10	10	13	8	17	5	23	8	10	8
Broken Hill ..	6	6	9	7	12	3	13	10	17	11	23	3	10	4
Goulburn ..	5	9	7	4	12	6	15	9	22	1	29	7	14	3
Bathurst ..	5	7	7	6	9	5	12	0	16	1	21	8	10	6
Melbourne ..	8	9	11	7	14	5	18	0	21	5	25	2	15	8
Ballarat ..	4	6	5	10	8	2	10	9	13	6	20	5	10	2
Bendigo ..	4	10	7	0	9	2	11	9	14	10	22	4	10	3
Geelong ..	4	11	8	8	11	6	15	2	20	8	24	4	13	7
Warrnambool ..	5	4	8	6	10	10	13	3	15	11	20	6	12	0
Brisbane ..	6	1	8	1	10	4	13	9	16	11	[illegible]	0	12	7
Toowoomba ..	5	0	7	5	10	5	12	5	14	9	22	1	12	8
Rockhampton ..	5	6	7	5	9	0	11	9	13	11	16	4	10	10
Charters Towers	4	10	7	3	10	1	11	10	15	8	20	11	9	5
Warwick ..	6	2	8	11	10	11	13	3	16	8	20	1	12	11
Adelaide ..	9	11	14	1	18	8	22	2	25	9	29	8	18	3
Moonta, &c. ..	5	8	7	0	8	6	11	2	14	0	14	7	8	11
Port Pirie ..	7	11	10	0	11	9	13	8	15	10	18	10	11	4
Mt. Gambier ..	5	6	7	2	9	4	11	6	14	3	17	5	10	1
Petersburg ..	8	0	10	0	12	6	15	0	17	6	20	0	12	7
Perth	8	8	11	5	14	3	17	2	20	11	27	0	13	7
Kalgoorlie ..	9	8	13	9	17	1	20	6	23	9	32	2	13	4
Mid. Junction	6	4	8	11	12	8	15	9	18	7	24	2	11	7
Bunbury ..	8	4	10	5	12	5	15	3	18	6	21	5	10	6
Geraldton ..	11	7	16	5	20	4	22	8	25	5	34	2	16	10
Hobart	7	3	9	9	11	10	14	3	17	6	20	8	12	10
Launceston ..	6	6	9	2	11	11	14	7	16	9	21	0	12	9
Zeehan	4	6	6	10	10	2	12	6	14	0	17	6	7	1
Beaconsfield ..	3	0	4	4	4	10	5	9	6	9	7	6	4	8
Queenstown ..	6	8	8	7	10	5	13	8	16	4	20	0	9	2
Weighted Average	7	2	9	5	12	0	14	9	18	4	23	7	12	4

* First 9 months only. † The rents are shewn to the nearest penny.

APPENDIX VI.

Average Annual Wolesale Prices in Melbourne, 1871 to 1912.

COMMODITY.	UNIT	1871. s. d.	1872. s. d.	1873. s. d.	1874. s. d.	1875. s. d.	1876. s. d.
GROUP I. METALS—							
Iron—Pig Mixed Nos.	ton	99 1¼	155 0	176 11	163 8	124 2	95 0
Rod and Bar	„	207 0	289 7½	331 2	320 9	263 2¼	223 1
Angle and Tee	„	227 0	295 7	360 0	336 11	279 3½	236 2
Plate	„	241 6	373 10	401 6¼	356 11	279 8	249 3
Hoop	„	230 6	331 6½	334 7½	334 3	301 5	257 4
Galvanised Corrugated	„	562 0	729 7	724 7	691 9	657 10	584 9½
Wire, Fencing	„	345 0	448 10	490 4½	516 11	420 9	358 1
Zinc—Sheet	„	527 0	651 11	750 0	748 10	677 6	614 3
Lead—Sheet	„	526 3	489 3	580 9	659 3	610 8½	564 7
Piping	„	520 0	520 0	586 2	584 7½	560 0	560 0
Copper—Sheet	lb.	1 0	1 1¼	1 0¾	1 1¼	1 2	1 2
Coal (on Wharf)	ton	*20 9	*28 5	39 8¾	33 7¼	31 0½	30 6½
GROUP II. TEXTILES, LEATHER, &c							
Jute Goods—Branbags	dozen	7 9⅝	8 7¾	8 3⅝	7 3⅛	5 6⅜	5 5⅛
Cornsacks	„	11 7½	13 2½	13 2⅞	11 2⅞	9 5⅞	7 8⅝
Woolpacks	each	3 9⅝	4 8⅛	4 2¼	3 6¼	3 0¾	2 6¾
Leather—Kip	lb.	1 11⅛	2 2⅛	2 2⅞	2 0½	2 1	1 9¼
Calf	„	3 6⅝	3 10	3 7⅞	3 3	3 3	3 0
Basils	dozen	14 5	15 8	15 0	13 0	13 4⅜	13 0
Cotton—Raw	lb.	0 7⅝	0 9⅛	0 8⅜	0 7¾	0 7½	0 6½
Silk—Raw	„	21 7½	21 5¼	20 11¾	16 9⅛	15 4¼	19 2¼
Wool	„	1 2¼	1 3	1 3¼	1 2⅞	1 4⅛	1 3⅛
GROUP III. AGRICULT'L PRODUCE							
Wheat	bushel	6 4⅜	6 3	5 11¼	6 2½	5 10½	5 9⅝
Flour	ton	298 6	296 0	273 0	271 2	230 9	254 6
Bran	bushel	1 1½	1 1½	1 3⅛	1 6	1 5½	1 4
Pollard	„	1 2	1 3½	1 2¾	1 7¾	1 5¾	1 4
Oats	„	3 5⅝	3 1	4 3½	5 5¼	3 11⅝	3 0⅜
Oatmeal	ton	420 0	407 4	526 2	640 0	544 3	409 3
Barley—Malting	bushel	4 3	5 8⅛	6 3¼	5 11½	5 6¾	4 9⅛
Feed	„	3 2	3 10	4 4⅛	4 9	3 10¾	3 1⅝
Maize	„	4 0	3 4⅜	3 10½	5 3¼	5 2⅞	4 1⅝
Hay	ton	103 4	105 5	138 4	120 0	118 9	143 9
Straw	„	55 0	53 9	75 5	75 5	75 3	75 0
Peas	bushel	4 2¼	3 4¾	4 2⅜	5 6⅛	4 7	3 7⅞
Potatoes	ton	49 9	70 2½	60 1½	95 7½	98 1½	95 5
GROUP IV. DAIRY PRODUCE—							
Ham	lb.	0 10¼	0 10	0 10¼	0 9⅛	0 11	1 0
Bacon	„	0 8⅛	0 8⅛	0 8⅜	0 8	0 9½	0 9¼
Cheese	„	0 6⅜	0 7⅞	0 8⅝	0 9⅛	0 9⅞	0 9¼
Butter	„	0 8¼	0 10⅞	0 10⅞	1 1	1 3⅝	1 4¾
Lard	„	0 4¾	0 6⅛	0 6⅞	0 7¾	0 8	0 8
Eggs	dozen	1 2⅞	1 2⅝	1 2⅞	1 3¾	1 4⅛	1 4½
Honey	lb.	0 4	0 4	0 3⅞	0 3⅞	0 4¼	0 4¾
GROUP V. GROCERIES, &c.—							
Currants	lb.	0 5½	0 4⅞	0 4⅞	0 4¾	0 5¼	0 5⅝
Raisins	„	0 7¼	0 7⅞	0 7⅝	0 7⅜	0 8⅝	0 8⅛
Herrings	doz. 1 lb. tins	9 0¼	8 1¼	9 1⅜	8 1¾	7 11¾	7 8½
Salmon	„	11 11½	12 7¾	15 3⅜	12 8½	9 6	10 8⅛
Sardines	doz. hlvs	12 5	13 4⅝	11 5½	9 8	8 11⅝	8 2½
Tea	lb.	1 7¼	1 7¾	1 7¾	1 8	1 7¾	1 7⅝
Coffee	„	0 11⅜	1 0¾	1 2⅞	1 5⅞	1 4⅛	1 5
Cocoa	„	1 2⅞	1 3½	1 3½	1 4¼	1 3⅛	1 3¼
Sugar	ton	852 0	882 4	843 1	763 1	732 6	743 1
Macaroni	lb.	0 9¾	0 10	0 10⅛	0 10	0 9⅜	0 9¾
Sago	„	0 2¾	0 2⅝	0 3⅛	0 2¾	0 2½	0 2¼
Rice	ton	431 0	402 4	466 4	489 3	446 5	382 6
Salt—Fine	„	84 8	90 7	92 9	97 11	81 6	71 0
Rock	„	74 9	116 0	94 3	92 4	109 8	70 5
Mustard	doz. 1 lb tins	19 1	18 4⅝	18 1⅝	18 3¾	18 1⅛	17 8¾
Starch	lb.	0 5⅜	0 5¾	0 5⅞	0 6⅜	0 6⅝	0 5⅞
Blue	„	0 9¾	0 10¼	0 11	0 11	0 11	0 11
Matches	gross	5 0	4 3	4 1⅜	4 1⅛	4 0⅛	4 0
Candles	lb.	0 10½	0 11⅛	0 11⅞	0 10⅝	0 10¼	0 10⅛
Kerosene	gallon	2 6	2 4⅛	2 3⅝	1 11½	1 9⅜	2 3
Tobacco	lb.	3 3¼	3 3⅛	3 3⅞	3 4	3 7⅜	3 7⅝
GROUP VI. MEAT—							
Beef	100 lb.	..	..	..	..	..	..
Mutton	lb.	..	..	..	..	..	..
Lamb	each	..	..	..	..	..	..
Veal	lb.	..	..	..	..	..	..
Pork	„	..	..	..	..	..	..
GROUP VII. BUILDING MATERIAL							
Timber—Flooring—6 x 1¼	100ft. lin	9 7½	10 3¼	15 1⅝	13 9⅝	12 1	12 8¼
6 x ⅞	„	8 4¾	9 4	11 5¼	12 1¼	10 11	10 3¼
6 x ¾	„	7 4¼	6 11¾	9 3	10 11¼	8 4	8 6¾
6 x ½	„	5 4	6 5⅝	6 9⅛	8 0⅜	6 10¼	7 7¼
Weatherboards	„	5 8	6 9⅛	6 8⅝	6 11⅝	6 9¾	8 0⅛
Oregon	1000ft. sp	184 0	172 8	296 10	193 8	152 7	155 8
Shelving	„	236 4	274 9½	289 3	210 10½	219 3	227 2½
Cement	cask	16 5	16 11	21 6	21 10	17 3⅜	16 2
White Lead	ton	800 0	800 0	848 6	852 4	817 2	840 0
GROUP VIII. CHEMICALS—							
Cream of Tartar	lb.	1 1½	1 2¼	1 3⅜	1 3	1 3⅛	1 3¼
Carbonate of Soda	ton	309 6	376 11	476 6	495 5	392 2	333 10
Saltpetre	„	754 0	872 4	817 3	730 9	694 3	606 2
Sulphur	„	328 0	333 1	282 4	302 4	265 4	295 0

* In Bay.

Average Annual Wholesale Prices in Melbourne, 1871 to 1912—contd.

COMMODITY.	UNIT.	1877.	1878.	1879.	1880.	1881.	1882.
GROUP I. METALS—		s. d.	s. d	s. d.	s. d.	s. d.	s. d.
Iron—Pig Mixed Nos. ..	ton	102 1½	87 0⅛	84 3½	102 3⅛	91 5	87 4
Rod and Bar ..	"	197 4	190 11⅛	181 11	211 6⅛	186 11	193 8
Angle and Tee ..	"	204 7½	198 5⅛	198 5½	231 6½	197 6	201 1
Plate	"	242 1½	221 6⅛	206 6¼	246 2	210 6	205 0
Hoop	"	225 0	205 9	194 7½	240 9	212 1⅛	202 4
Galvanised Corrugated	"	539 0½	468 10	451 6½	484 0	435 4	438 10
Wire, Fencing ..	"	307 7	285 0	266 2	283 1	283 2	276 2
Zinc—Sheet	"	613 10	550 0	507 8	540 0	530 9	487 8
Lead—Sheet	"	560 0	523 1	477 4	476 11	466 2	460 0
Piping	"	560 0	560 0	560 0	560 0	544 7	449 3
Copper—Sheet	lb.	1 2	1 1⅜	1 0⅛	1 0	0 11⅞	0 11¼
Coal (on Wharf)	ton	31 6½	30 5	29 3	30 10¼	25 11⅛	30 7½
GROUP II TEXTILES, LEATHER, &c							
Jute Goods—Branbags ..	dozen	6 5⅜	6 4¼	6 1½	6 6	6 10⅜	6 1⅞
Cornsacks ..	"	9 5⅛	9 0⅜	7 10⅛	8 9¼	9 8⅝	8 8⅛
Woolpacks ..	each	3 1⅜	3 2¼	2 6⅛	3 4⅛	3 3⅛	3 3⅞
Leather—Kip	lb.	1 10⅛	1 8⅛	1 6	1 6⅝	1 8⅜	1 5⅛
Calf	"	2 9¼	2 7¼	2 4⅜	2 3⅝	2 9⅞	2 5
Basils	dozen	9 6	9 0⅛	11 9¾	11 0¼	13 10⅞	14 0
Cotton—Raw	lb.	0 6½	0 6	0 5⅛	0 6⅜	0 6¼	0 6¼
Silk—Raw	"	20 0½	17 7¾	17 5	17 0¼	16 11¾	16 6⅝
Wool	"	1 3	1 2½	1 2⅛	1 2¾	1 2½	1 0⅝
GROUP III. AGRICULT'L PRODUCE							
Wheat	bushel	6 6½	5 4	5 5¼	4 4½	4 11	6 1⅝
Flour	ton	287 4	227 1	226 1	188 9	208 6	255 7
Bran	bushel	1 3⅞	1 2⅛	1 2⅞	0 10⅜	1 0⅛	1 6⅛
Pollard	"	1 4⅛	1 4⅝	1 3½	0 11	1 1⅛	1 6⅛
Oats	"	3 8⅞	4 9	3 3⅛	2 2⅝	3 0⅛	3 10⅝
Oatmeal	ton	443 1	575 5	466 2	344 7	333 10	387 8
Barley—Malting	bushel	4 8¾	6 3⅛	6 7½	4 1⅝	3 3⅛	4 8⅛
Feed	"	3 6	4 1⅞	3 6⅛	2 4	2 9⅝	4 2¾
Maize	"	4 3¼	5 1⅝	3 7⅛	3 0½	4 2⅛	6 1
Hay	ton	115 0	102 6	119 2	87 11	83 4	128 9
Straw	"	67 3	63 1	69 4	50 5	45 7	62 3
Peas	bushel	3 11⅞	5 3	3 10⅜	2 4⅞	3 6¼	4 8⅛
Potatoes	ton	82 11	95 7½	107 3⅝	45 10	59 4½	92 1
GROUP IV. DAIRY PRODUCE—							
Ham	lb.	0 11¾	0 11⅛	0 9⅛	0 9	0 8	0 7⅝
Bacon	"	0 8¾	0 8⅛	0 6⅝	0 6⅜	0 6⅛	0 6⅞
Cheese	"	0 8⅝	0 7⅞	0 6⅛	0 5⅞	0 5	0 8⅞
Butter	"	1 3	0 11¾	1 1¼	0 9¼	0 10⅜	1 5
Lard	"	0 7⅛	0 8¼	0 6	0 5⅝	0 5	0 7⅛
Eggs	dozen	1 5¼	1 5¼	1 3⅛	1 1¾	1 1⅛	1 3⅞
Honey	lb.	0 4⅜	0 5	0 4⅛	0 4⅞	0 4⅝	0 4⅜
GROUP V. GROCERIES, &c.—							
Currants	lb.	0 5¼	0 4⅛	0 4⅛	0 5⅝	0 5⅛	0 5
Raisins	"	0 6⅜	0 5⅛	0 6¼	0 6⅞	0 8¼	0 7
Herrings	doz. 1 lb. tins	7 4½	7 0⅛	6 10⅛	7 3	6 10⅛	7 1⅞
Salmon	"	12 10⅜	9 1⅛	8 3⅛	9 2⅝	8 9⅛	9 4⅜
Sardines	doz. hlvs	11 5⅜	8 7¼	7 7⅛	7 8¾	9 7	10 1⅞
Tea	lb.	1 7	1 6⅝	1 5⅜	1 4⅛	1 3⅞	1 3⅜
Coffee	"	1 4¾	1 4⅝	1 3⅞	1 3⅜	1 1⅛	1 0⅝
Cocoa	"	1 3¼	1 3¼	1 3⅜	1 3⅛	1 3⅝	1 3
Sugar	ton	780 9	737 4	763 10	806 2	760 0	760 0
Macaroni	lb.	0 10⅛	0 10⅛	0 10½	0 11	0 10	0 10
Sago	"	0 2½	0 2¾	0 2¾	0 2⅝	0 2⅜	0 2⅝
Rice	ton	406 10	494 2	418 0	479 6	436 0	455 3
Salt—Fine	"	90 1	80 8	82 1	91 8	84 6	81 5
Rock	"	74 10	52 11	50 6	82 4	66 10	48 3
Mustard	doz. 1 lb. tins	17 5	17 5	17 11⅞	18 1	18 1⅞	18 6
Starch	lb.	0 5⅝	0 6⅛	0 6⅛	0 6¼	0 5⅞	0 5⅞
Blue	"	0 11	0 11	0 10⅞	0 9⅝	0 9⅜	0 9⅞
Matches	gross	3 7⅛	3 4¾	3 0¾	2 8⅝	2 11¼	2 4⅞
Candles	lb.	0 10⅛	0 9¾	0 9⅛	0 8⅝	0 8⅛	0 8¼
Kerosene	gallon	2 2⅞	1 7⅝	1 5⅛	1 6⅛	1 6⅞	1 5⅞
Tobacco	lb.	3 7	3 4½	3 3⅝	3 3⅛	4 3⅜	4 5¼
GROUP VI. MEAT—							
Beef	100 lb.	..	..	..	..	..	..
Mutton	lb.	..	..	..	..	..	..
Lamb	each	..	..	..	..	..	..
Veal	lb.	..	..	..	..	..	..
Pork	"	..	..	..	..	..	..
GROUP VII. BUILDING MATERIAL							
Timber—Flooring—6 x 1¼	100ft. lin	13 0½	10 6¼	9 11½	11 6½	11 7¼	11 7⅛
6 x ⅞	"	10 9½	9 6⅛	8 0¾	9 6⅛	9 11	10 0⅝
6 x ¾	"	9 9	8 0½	7 2	7 11¼	8 4	7 11¾
6 x ½	"	7 5	6 9⅛	5 9¾	6 1⅜	6 4	6 7
Weatherboards ..	"	6 11	6 10¾	6 3⅛	6 10⅜	7 3¼	7 3⅜
Oregon	1000ft sp	164 4	125 10½	123 4	146 10	183 11	149 11
Shelving	"	217 9½	178 6	174 11	187 7	233 0	235 0
Cement	cask	16 6	15 9¾	17 6¾	16 5¼	16 8⅛	14 7⅜
White Lead	ton	855 6	789 3	762 0	750 9	735 5	672 4
GROUP VIII. CHEMICALS—							
Cream of Tartar	lb.	1 4	1 2¾	1 3	1 4½	1 4⅝	1 3¾
Carbonate of Soda ..	ton	303 1	263 6	280 5	342 8	290 0	262 1
Saltpetre	"	643 10	641 6	658 1	675 5	608 6	690 9
Sulphur	"	358 6	279 7	278 6	360 0	309 3	308 1

Average Annual Wholesale Prices in Melbourne, 1871 to 1912—contd.

COMMODITY.	UNIT.	1883.	1884.	1885.	1886.	1887.	1888.
		s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
GROUP I. METALS—							
Iron—Pig Mixed Nos. ..	ton	84 3	78 10	75 10⅛	72 4	74 9	86 4
Rod and Bar ..	,,	182 6	180 0	165 10	151 6½	139 8½	148 5⅛
Angle and Tee ..	,,	197 6	199 0	182 8	164 7¼	160 0	153 1
Plate	,,	209 3	210 0	202 3	180 0	180 0	180 0
Hoop	,,	200 9	200 0	190 0	180 0	176 2	171 2
Galvanised Corrugated	,,	438 6	399 5	363 3	333 8	333 3	363 6
Wire, Fencing ..	,,	254 7	254 5	211 6½	185 4¼	173 10	188 3
Zinc—Sheet	,,	469 2¼	466 9¼	446 11	433 10	415 0	427 4
Lead—Sheet	,,	444 3	372 10	359 7½	396 9	404 7¼	416 11
Piping	,,	426 6	410 0	410 0	410 0	371 6½	410 0
Copper—Sheet	lb.	0 10⅞	0 10¼	0 10	0 9	0 8¼	0 11¾
Coal (on Wharf)	ton	28 9	28 6½	30 0	29 3	25 9	29 11½
GROUP II. TEXTILES, LEATHER, &c							
Jute Goods—Branbags ..	dozen	4 10⅝	5 1⅜	4 1⅝	3 10⅝	3 11½	4 7¾
Cornsacks ..	,,	7 7¼	6 11⅝	5 8¾	4 11¼	5 10⅝	6 3¼
Woolpacks ..	each	2 9⅝	2 7	2 3½	2 5¼	2 8	2 2½
Leather—Kip	lb.	1 6	1 6	1 6	1 6	1 6	1 6
Calf	,,	2 8	2 7½	2 7½	2 6⅞	2 6	2 6
Basils	dozen	14 0	14 0	14 0	14 0	14 0⅞	14 0
Cotton—Raw	lb.	0 6¼	0 6⅛	0 6⅛	0 5⅜	0 5⅜	0 5¼
Silk—Raw	,,	16 2½	14 9½	14 1	13 8¾	13 7⅝	12 3½
Wool	,,	1 0⅝	1 0⅛	0 10¼	0 9⅜	0 10⅝	0 10⅜
GROUP III. AGRICULT'L PRODUCE							
Wheat	bushel	4 11	4 2⅞	3 10⅞	4 9⅝	3 9½	3 9⅝
Flour	ton	204 9	177 11	159 4	203 7	169 4	176 8
Bran	bushel	1 1	1 0	1 0⅝	1 1⅜	0 9⅜	0 10¼
Pollard	,,	1 1⅛	1 0⅛	1 0¼	1 1⅛	0 9	0 9¼
Oats	,,	3 1⅜	3 0⅝	2 10¼	2 10	2 7⅜	2 10⅞
Oatmeal	ton	357 9	344 8	363 10	385 9	376 6	383 6
Barley—Malting	bushel	5 6	4 2⅛	4 4⅝	3 11⅛	5 3⅛	5 5
Feed	,,	3 10	2 11⅞	2 11¾	2 11	3 7	3 2⅜
Maize	,,	4 4	5 0⅛	4 2¾	4 3¼	4 0⅝	3 7⅝
Hay	ton	120 10	104 2	119 2	119 7	126 3	112 11
Straw	,,	57 6	53 9	58 4	59 2	61 8	55 0
Peas	bushel	3 7⅛	3 4¼	3 3¼	3 5	3 4¼	2 11¾
Potatoes	ton	63 4	75 5	62 7	71 5⅛	61 5¼	70 0
GROUP IV. DAIRY PRODUCE—							
Ham	lb.	0 9¼	0 9⅝	0 9⅝	0 9¼	0 9½	0 9⅜
Bacon	,,	0 8⅜	0 8⅝	0 8⅜	0 8¼	0 8¼	0 8⅞
Cheese	,,	0 7½	0 6⅜	0 7⅜	0 7¼	0 6½	0 5⅜
Butter	,,	1 0⅛	1 1⅜	1 4⅛	1 3⅞	1 0⅜	1 2⅜
Lard	,,	0 8⅛	0 7	0 7	0 6⅝	0 6¼	0 5⅛
Eggs	dozen	1 2⅜	1 2⅞	1 3⅛	1 2⅝	1 2⅛	1 2
Honey	lb.	0 5⅛	0 5¼	0 4	0 3⅞	0 4⅛	0 4⅛
GROUP V. GROCERIES, &c.—							
Currants	lb.	0 5⅛	0 5	0 4⅜	0 5	0 5⅜	0 4⅜
Raisins	,,	0 6¾	0 6⅛	0 5¼	0 5⅛	0 5⅝	0 5¾
Herrings	doz. 1 lb. tins	7 2⅜	6 4⅝	5 11⅝	5 9⅞	5 9⅛	6 1⅜
Salmon	,,	8 11⅞	8 1⅛	7 4⅝	8 9¼	9 3	9 10⅝
Sardines	doz. hlvs	9 8¼	8 2⅝	7 10⅜	7 10⅜	7 9	7 1¼
Tea	lb.	1 3½	1 2¾	1 3⅛	1 2¼	1 1⅝	1 2
Coffee	,,	1 1	1 0⅝	1 0	0 11⅛	1 3	1 3
Cocoa	,,	1 3¼	1 3	1 2⅞	1 2½	1 2⅜	1 2⅜
Sugar	ton	755 0	683 7	518 6	494 3	485 9	470 9
Macaroni	lb.	0 10⅛	0 8⅞	0 7⅜	0 7¾	0 7⅜	0 7¼
Sago	,,	0 2⅛	0 1⅞	0 1¼	0 1¼	0 1⅛	0 2¼
Rice	ton	435 10	459 0	438 9	406 6	440 0	413 0
Salt—Fine	,,	80 7	80 9	81 9	84 7	81 8	83 5
Rock	,,	52 7	58 0	53 3	68 8	65 6	56 9
Mustard	doz 1 lb. tins	18 3¾	18 3	18 3	18 3	18 0¼	17 9¼
Starch	lb.	0 5⅝	0 5¼	0 5	0 4⅝	0 4⅝	0 4⅝
Blue	,,	0 9½	0 9⅜	0 9¼	0 8⅜	0 8⅜	0 8¼
Matches	gross	1 11	2 2⅛	2 4¾	2 2⅜	1 9⅛	1 9¼
Candles	lb.	0 9¾	0 9¼	0 8⅝	0 7¼	0 6⅜	0 6⅝
Kerosene	gallon	1 5¾	1 5½	1 4¾	1 5½	1 6⅝	1 7⅞
Tobacco	lb.	4 5	4 5	4 4½	4 5	4 5	4 4¾
GROUP VI. MEAT—							
Beef	100 lb.	..	23 3⅝	21 7¼	..	..	..
Mutton	lb.	..	0 2⅛	0 1⅞	..	..	..
Lamb	each	..	7 2½	7 4½	..	..	..
Veal	lb.	..	0 2¾	0 3¼	..	..	..
Pork	,,	..	0 7½	0 6¾	..	..	..
GROUP VII. BUILDING MATERIAL							
Timber—Flooring—6 x 1⅛	100ft. lin	9 9¼	8 5¼	8 10⅝	8 10⅛	8 7	9 0½
6 x ⅞	,,	7 10⅝	7 5⅜	8 1⅝	7 1¼	6 8	8 1
6 x ¾	,,	6 7¼	5 2¼	6 0⅛	5 10¾	5 5⅛	6 10½
6 x ½	,,	5 0½	4 6	5 4⅛	4 6⅝	4 3¾	4 6⅞
Weatherboards ..	,,	6 0¼	6 0⅝	5 6⅞	4 10½	4 10½	6 0⅜
Oregon	1000ft sp	136 0	129 10	137 8	98 1	111 3	138 1
Shelving	,,	227 3	222 11⅜	218 6¾	103 3	223 2	250 3
Cement	cask	15 2½	15 0⅝	14 2	12 3⅝	12 1	15 8⅝
White Lead	ton	634 7	608 6	550 0	530 9	535 0	598 6
GROUP VIII. CHEMICALS—							
Cream of Tartar	lb.	1 4⅜	1 4⅝	1 4¼	1 4	1 4⅜	1 4¼
Carbonate of Soda ..	ton	238 4	213 10	204 6	195 5	188 4	166 2
Saltpetre	,,	660 0	651 5	630 0	576 10	564 7	547 8
Sulphur	,,	260 0	260 0	244 7	236 2	218 6	234 7

Average Annual Wholesale Prices in Melbourne, 1871 to 1912—contd.

COMMODITY.	UNIT.	1889.	1890.	1891.	1892.	1893.	1894.
		s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
GROUP I. METALS—							
Iron—Pig Mixed Nos. ..	ton	83 7	90 0	78 3	76 3	70 5½	66 5
Rod and Bar ..	"	163 0	205 1	181 11	165 9	160 0	157 10¼
Angle and Tee ..	"	147 7	161 9	190 4½	182 2½	182 6	182 6
Plate	"	180 0	180 0	180 0	180 0	180 0	180 0
Hoop	"	174 3	192 4	185 4½	190 4½	190 4½	175 0
Galvanised Corrugated	"	377 6	420 9	388 0	358 8	347 3	328 4
Wire, Fencing ..	"	195 0	232 0	209 9	178 0	161 4	156 4
Zinc—Sheet	"	458 1	567 8	612 4	612 8	550 0	545 0
Lead—Sheet	"	402 8	420 0	420 0	420 0	420 0	420 0
Piping	"	425 4½	460 0	460 0	460 0	460 0	460 0
Copper—Sheet	lb.	1 0½	0 10	0 9⅝	0 9	0 8¾	0 8¾
Coal (on Wharf)	ton	24 0	35 6	18 0	18 8	18 0	14 7
GROUP II. TEXTILES, LEATHER, &C.							
Jute Goods—Branbags ..	dozen	4 10⅛	4 7	4 3⅞	4 1⅛	3 9½	3 4⅞
Cornsacks ..	"	5 9⅞	6 0	5 3½	5 8⅛	5 0⅜	4 9⅝
Woolpacks ..	each	2 0¼	2 2⅜	1 10⅞	2 1¾	1 11½	1 9⅛
Leather—Kip	lb.	1 6	1 5¼	1 3¾	1 3⅛	1 1	1 0¼
Calf	"	2 6	2 5½	2 4⅛	2 4¼	1 11¾	1 8
Basils	dozen	14 0	14 5⅝	16 10⅝	13 6	18 6	16 2
Cotton—Raw	lb.	0 5⅝	0 5¾	0 5½	0 5⅛	0 5¼	0 4⅛
Silk—Raw	"	14 0½	14 2½	13 6	13 1	12 10¼	13 0⅜
Wool	"	0 10⅛	0 11	0 9¾	0 9	0 8⅞	0 8⅝
GROUP III. AGRICULT'L PRODUCE							
Wheat	bushel	5 2⅛	3 9⅛	4 8¼	4 0⅛	3 0⅜	2 3⅛
Flour	ton	230 6	168 11½	218 5½	194 9	150 8	119 0
Bran	bushel	1 1⅛	0 9¾	0 10½	0 10½	0 8	0 6¼
Pollard	"	1 1¾	0 10¼	0 10⅜	0 11⅛	0 8⅜	0 7⅛
Oats	"	3 7½	2 7¾	2 5⅓	2 2	1 10	1 7⅛
Oatmeal	ton	451 2	416 6	394 7	313 10	283 10	263 1
Barley—Malting	bushel	5 6	3 10	3 1⅝	3 7⅝	4 7	4 10⅜
Feed	"	3 6¼	2 2⅛	2 0½	2 4⅜	2 2	2 1⅝
Maize	"	4 1⅛	3 10	3 4⅓	2 9½	3 2	2 3
Hay	ton	155 10	95 5	91 8	90 10	73 4	56 8
Straw	"	67 11	53 4	50 0	54 4	40 7	38 5
Peas	bushel	4 7	3 2⅛	2 6	2 8⅓	2 4⅜	1 11
Potatoes	ton	105 7½	80 2½	58 6⅓	53 4	87 10	47 8⅓
GROUP IV. DAIRY PRODUCE—							
Ham	lb.	0 10	0 9⅜	0 9¼	0 8¾	0 7⅞	0 6⅞
Bacon	"	0 8½	0 8⅓	0 7½	0 7⅜	0 6½	0 5⅛
Cheese	"	0 6	0 5⅞	0 5⅝	0 6⅜	0 5⅛	0 4⅞
Butter	"	0 11⅞	1 0⅞	0 11⅛	1 0¾	0 9½	0 7½
Lard	"	0 5	0 4⅜	0 4⅝	0 6	0 5⅓	0 4
Eggs	dozen	1 4⅜	1 1⅜	1 2	1 0⅜	0 11	0 10⅛
Honey	lb.	0 3½	0 4½	0 3⅞	0 3	0 2⅜	0 3⅛
GROUP V. GROCERIES, &C.—							
Currants	lb.	0 4⅜	0 4⅝	0 4¾	0 4⅝	0 5¼	0 4⅜
Raisins	"	0 5⅝	0 7⅞	0 7⅓	0 5⅝	0 5⅜	0 5⅛
Herrings	doz. 1 lb. tins	6 4⅛	5 10	5 5¼	5 6⅞	5 6⅜	5 6⅜
Salmon	"	9 2	7 5⅞	7 1⅛	7 2⅓	7 3¾	7 2¾
Sardines	doz. hlvs	6 9½	6 6⅜	6 3⅛	6 4⅝	6 11⅝	5 11⅛
Tea	lb.	1 1⅞	0 11⅝	0 11¾	0 11⅛	1 0¼	1 0⅜
Coffee	"	1 3⅓	1 5⅛	1 2⅛	1 2⅛	1 1⅞	1 1⅞
Cocoa	"	1 2⅞	1 2¼	1 2¼	1 2⅜	1 2⅜	1 2⅛
Sugar	ton	520 9	484 7	458 6	450 0	465 5	505 0
Macaroni	lb.	0 7	0 6¾	0 7	0 6⅝	0 6⅜	0 6⅝
Sago	"	0 2⅝	0 2¼	0 2⅛	0 1⅝	0 1½	0 1⅞
Rice	ton	416 2	468 4	447 0	442 8	402 2	393 4
Salt—Fine	"	90 0	98 10	87 11	84 3	82 6	81 0
Rock	"	54 3	57 4	54 8	49 0	47 6	47 6
Mustard	doz. 1 lb. tins	17 9	17 9	17 8⅝	17 8¼	17 8¼	17 8¼
Starch	lb.	0 4¾	0 4⅞	0 4½	0 4¾	0 4⅝	0 4¾
Blue	"	0 8⅛	0 8¼	0 8⅛	0 8¼	0 8¼	0 8¾
Matches	gross	1 9	1 5⅞	1 6	1 3⅝	1 4⅝	1 4¾
Candles	lb.	0 6⅝	0 7⅛	0 7	0 6⅞	0 7¼	0 7¼
Kerosene	gallon	1 6⅜	0 11⅞	0 9⅜	0 8⅛	0 8⅛	0 8⅛
Tobacco	lb.	4 4⅜	4 4¼	4 4⅓	4 4⅝	4 5⅜	4 6
GROUP VI. MEAT—							
Beef	100 lb.	..	18 6½	16 7½	17 3⅞	15 11¼	13 0¾
Mutton	lb.	..	0 2⅓	0 1⅞	0 1⅞	0 1¾	0 1⅛
Lamb	each	..	7 11¼	7 2⅛	6 6⅞	5 10⅜	5 6⅜
Veal	lb.	..	0 2⅞	0 2	0 2	0 1⅞	0 1⅛
Pork	"	..	0 5¼	0 5	0 4⅜	0 4⅛	0 3¼
GROUP VII. BUILDING MATERIAL							
Timber—Flooring—6 x 1¼	100ft. lin	9 10⅞	8 8¾	7 3⅛	7 1⅜	6 7	6 10¼
6 x ⅞	"	8 6⅛	7 2¼	6 0¾	5 9⅓	5 4⅛	5 8
6 x ¾	"	6 10⅝	5 11¾	5 4⅞	4 5⅓	4 2⅜	4 8¼
6 x ½	"	5 1⅞	4 8⅝	4 5¾	3 11¾	3 8⅞	4 0⅝
Weatherboards ..	"	5 6⅛	4 7¼	4 2⅜	4 6⅓	4 8⅓	4 5¾
Oregon	1000ft sp	130 11½	136 3	113 9	92 4	100 0	104 4
Shelving	"	270 11	242 5	221 6¼	190 3	218 6	205 5
Cement	cask	15 7	14 6	12 9	12 2	12 5½	11 9⅛
White Lead	ton	605 9	585 5	605 5	595 9	547 8	540 0
GROUP VIII. CHEMICALS—							
Cream of Tartar	lb.	1 2⅛	1 2	1 0¾	1 0⅛	0 10⅜	0 8⅝
Carbonate of Soda ..	ton	157 7	187 7	208 4	204 6	193 0	196 3
Saltpetre	"	538 2	557 7	554 2	546 10	517 3	543 1
Sulphur	"	220 2	231 6	228 3	236 6	220 7	254 7

Average Annual Wholesale Prices in Melbourne, 1871 to 1912—contd.

COMMODITY.	UNIT.	1895.		1896.		1897.		1898.		1899.		1900.	
		s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
GROUP I. METALS—													
Iron—Pig Mixed Nos. ..	ton	61	5	59	4½	70	4¼	65	4½	81	7¼	108	5½
Rod and Bar ..	„	158	0¼	156	11	160	0	163	5½	210	0	260	0
Angle and Tee ..	„	182	6	184	3	190	0	190	11½	207	1¼	266	11
Plate	„	180	0	181	2	185	0	185	0	205	9	263	10
Hoop	„	175	0	175	0	176	11	180	4½	212	4	271	2
Galvanised Corrugated	„	304	8	317	2	304	3	304	5	356	6¼	392	11
Wire, Fencing ..	„	149	2¼	157	5	166	3	170	2	200	6	230	2
Zinc—Sheet	„	520	8½	460	0	460	0	480	0	658	5¼	704	3
Lead—Sheet	„	420	0	340	9	345	0	336	2	400	0	426	2
Piping	„	460	0	330	9	320	0	323	10	393	6¼	442	1¼
Copper—Sheet	lb.	0	8¾	0	8⅝	0	8¾	0	8½	0	8⅝	0	8¾
Coal (on Wharf)	ton	13	9¼	17	1	17	1	18	1	19	6	21	4½
GROUP II TEXTILES, LEATHER, &c													
Jute Goods—Branbags ..	dozen	3	5⅛	3	8¼	3	6⅝	3	2	3	5	3	11¾
Cornsacks ..	„	4	2¾	4	3⅛	4	3⅞	4	5½	5	5⅝	5	7
Woolpacks ..	each	1	7¼	1	4⅜	1	4⅝	1	4¾	1	9⅜	1	10⅝
Leather—Kip	lb.	1	0⅝	1	1⅛	1	1	1	1	1	1¼	1	3⅜
Calf	„	1	9¼	1	9¾	1	10⅞	2	0	2	0¼	2	5⅝
Basils	dozen	14	5	14	7	13	6	13	1	14	0	18	8
Cotton—Raw	lb.	0	4¼	0	5	0	4½	0	3⅞	0	4⅛	0	5⅝
Silk—Raw	„	12	7¾	12	6¼	12	4	12	6¼	12	9¼	12	11¾
Wool	„	0	8⅛	0	8¾	0	8¼	0	8½	0	8⅞	0	10¼
GROUP III. AGRICULT'L PRODUCE													
Wheat	bushel	2	10⅝	5	0¾	5	8⅛	3	8¼	2	9¼	2	9⅛
Flour	ton	142	3	249	2	289	2	196	10	130	3	124	11
Bran	bushel	0	9	0	11½	0	10⅜	0	9⅛	0	7⅞	0	9½
Pollard	„	0	9⅞	1	1¾	1	1½	0	9¾	0	8⅝	0	10⅝
Oats	„	1	8¾	3	0	2	2¼	2	0¼	1	8⅜	2	3
Oatmeal	ton	272	10	391	2	331	2	270	2	234	7	306	11
Barley—Malting	bushel	3	5½	4	4½	4	5¼	5	3¼	4	7¼	3	4¼
Feed	„	1	9¼	3	3¼	2	8⅝	2	2½	1	11⅜	1	11¾
Maize	„	2	3⅝	3	5⅜	3	1⅞	2	8	2	10¼	2	6
Hay	ton	68	11	92	11	84	2	69	2	56	10	59	9
Straw	„	39	9	57	6	49	1	36	9	31	2	32	2
Peas	bushel	2	3¼	3	9⅜	3	9	3	2	2	9½	3	3¼
Potatoes	ton	29	4⅝	79	2	57	11	160	4	41	5¼	50	11
GROUP IV. DAIRY PRODUCE—													
Ham	lb.	0	6⅝	0	7⅞	0	8½	0	9½	0	8¼	0	8⅝
Bacon	„	0	5⅛	0	6⅜	0	7	0	7⅞	0	6⅛	0	6⅜
Cheese	„	0	4¼	0	5¼	0	4⅞	0	6	0	4¼	0	5¼
Butter	„	0	8¼	0	9⅞	0	10⅜	1	0¼	0	9¼	0	9⅜
Lard	„	0	3⅞	0	5⅜	0	5¾	0	6⅛	0	4½	0	3⅞
Eggs	dozen	0	8⅝	1	0¼	1	0¼	0	11⅝	0	9⅝	0	9⅞
Honey	lb.	0	2¼	0	3½	0	3⅜	0	4⅜	0	3¼	0	3⅞
GROUP V. GROCERIES, &c.—													
Currants	lb.	0	4⅝	0	4⅞	0	5¼	0	5⅛	0	4⅞	0	6⅛
Raisins	„	0	5½	0	5⅜	0	7	0	7¼	0	7⅜	0	7⅛
Herrings	doz. 1 lb. tins	5	6½	5	5⅞	5	7	5	7⅜	5	6¼	5	10¼
Salmon	„	7	0	7	2⅞	7	1¼	6	11	7	0½	9	6⅜
Sardines	doz. hlvs	5	6¼	5	6¼	5	6⅜	5	4⅞	5	3⅞	5	6⅜
Tea	lb.	1	0⅜	1	0⅝	1	0⅜	1	0½	0	11⅞	0	11⅛
Coffee	„	1	1½	1	0⅞	1	1	1	0⅞	1	0	0	11¾
Cocoa	„	1	2⅜	1	2⅛	1	2⅛	1	2⅜	1	2⅛	1	2⅛
Sugar	ton	454	3	465	5	453	10	440	0	440	0	452	4
Macaroni	lb.	0	6¼	0	5⅞	0	5¾	0	6⅛	0	6½	0	6⅛
Sago	„	0	1½	0	1⅛	0	1	0	1⅛	0	1⅝	0	1¾
Rice	ton	377	2	382	9	406	0	443	0	416	6	414	7
Salt—Fine	„	75	0	71	3	73	7	74	11	74	10	72	6
Rock	„	47	6	43	3	40	3	47	5	44	11	40	3
Mustard	doz. 1 lb. tins	17	8¼	17	8½	17	8¼	17	8¼	17	8¼	17	8¼
Starch	lb.	0	4¾	0	4¾	0	4¾	0	4¾	0	4¾	0	4¾
Blue	„	0	8½	0	8¼	0	8¼	0	8¼	0	8¼	0	8¼
Matches	gross	1	3⅜	1	3⅜	1	3	1	3	1	3	1	2⅝
Candles	lb.	0	7¼	0	6⅞	0	5¼	0	5⅛	0	6	0	6¾
Kerosene	gallon	0	9¼	0	9⅛	0	9⅛	0	8¼	0	9¼	0	11½
Tobacco	lb.	4	6	4	6	4	6	4	6	4	6	4	6
GROUP VI. MEAT—													
Beef	100 lb.	13	7	17	6½	20	7½	22	8¾	19	1½	21	8¾
Mutton	lb.	0	1⅜	0	1⅛	0	2½	0	2¼	0	1⅞	0	2¾
Lamb	each	5	6⅞	5	6⅜	7	1	7	9¼	7	5½	8	9⅝
Veal	lb.	0	1½	0	1¼	0	2	0	2¼	0	2¼	0	2½
Pork	„	0	3	0	3⅜	0	4⅜	0	5	0	4⅛	0	4
GROUP VII. BUILDING MATERIAL													
Timber—Flooring—6 x 1¼	100ft. lin	7	4⅝	7	5¾	8	1½	8	5¼	8	3⅜	9	1
6 x ⅞	„	6	2¼	6	9¼	7	0	7	1½	6	9	7	5⅝
6 x ⅝	„	5	7⅜	5	11⅜	6	4⅜	6	7¼	6	0¼	6	6¾
6 x ½	„	4	0⅜	4	3⅜	4	7⅜	4	9¼	4	4	4	9¼
Weatherboards ..	„	4	2¼	4	4⅞	4	10⅝	5	2⅜	4	10⅝	5	1
Oregon	1000ft sp	122	11	116	3	100	3¼	125	1	124	0¼	144	5
Shelving	„	216	1	214	7	218	6	215	9	193	6	224	3
Cement	cask	12	8¼	12	7¼	12	10¼	14	6½	15	0	14	11½
White Lead	ton	540	0	537	0	537	4	568	6	638	6	786	2
GROUP VIII. CHEMICALS—													
Cream of Tartar	lb.	0	9⅝	0	11½	0	10	0	9¼	0	9¼	0	9¼
Carbonate of Soda ..	ton	190	7½	184	5	196	2	194	8½	154	3	149	0½
Saltpetre	„	568	11	562	8	524	7	523	6	527	4	530	0
Sulphur	„	285	4	175	0	166	0	157	6	163	6	172	4

Average Annual Wholesale Prices in Melbourne, 1871 to 1912—contd.

COMMODITY.	UNIT.	1901.	1902.	1903.	1904.	1905.	1906.
GROUP I. METALS—		s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Iron—Pig Mixed Nos. ..	ton	90 4½	77 6½	84 1	78 0	75 0	80 7
Rod and Bar ..	,,	230 4½	191 2	180 11¼	179 0½	177 10½	192 8
Angle and Tee ..	,,	230 7	214 3	209 4¾	205 0	195 0	197 4
Plate	,,	226 4	212 8	209 4½	200 0	198 1	197 4
Hoop	,,	253 0	225 0	215 0	206 4	195 7	198 10
Galvanised Corrugated	,,	369 7	351 9	351 4	340 7	332 11	343 3
Wire, Fencing ..	,,	183 11	164 0	165 8	153 3	160 9	170 2
Zinc—Sheet	,,	616 11	549 3	548 7	560 9	640 9	696 11
Lead—Sheet	,,	378 5¾	281 11	294 3	290 0	337 8	417 4
Piping	,,	364 9¼	303 10	347 4	370 0	383 1	449 3
Copper—Sheet	lb	0 8¾	0 8⅞	0 9	0 9¼	0 10	1 0¼
Coal (on Wharf)	ton	23 9	23 0	19 11	15 8¾	14 6	17 3
GROUP II TEXTILES, LEATHER, &c.							
Jute Goods—Branbags ..	dozen	4 0¼	3 11⅞	3 6⅜	3 6½	3 9⅝	5 0¾
Cornsacks ..	,,	5 1¼	4 5⅛	4 11⅝	5 9⅛	6 3	6 11⅛
Woolpacks ..	each	1 10⅛	1 8⅞	1 10	1 10½	2 1¼	2 4¼
Leather—Kip	lb	1 3⅞	1 3	1 3	1 3	1 3	1 5⅝
Calf	,,	2 3½	2 0	1 11½	1 6	1 6	2 2
Basils	dozen	18 0	18 0	18 0	18 0	18 0	23 2¾
Cotton—Raw	lb.	0 5¼	0 5½	0 6	0 6¾	0 5¾	0 6⅝
Silk—Raw	,,	11 6¼	11 7¼	13 3¾	13 3	13 1¾	14 1¾
Wool	,,	0 7⅞	0 7¾	0 8⅞	0 9¼	0 10	0 11¼
GROUP III. AGRICULT'L PRODUCE							
Wheat	bushel	2 9¼	4 3¼	5 2¼	3 2¼	3 4¾	3 2¾
Flour	ton	122 4	183 7	231 8	151 2	148 8	142 9
Bran	bushel	0 9⅞	1 2⅝	1 0¼	0 7⅝	0 10	0 9⅞
Pollard	,,	0 10¼	1 3⅜	1 2¼	0 7⅝	0 11¼	0 10¼
Oats	,,	2 3¼	3 1⅞	2 8	1 10	2 1¾	2 8¼
Oatmeal	ton	288 3	391 6	335 9	215 9	243 1	300 0
Barley—Malting	bushel	3 3¼	4 5½	4 6½	3 5	3 11¼	4 6¾
Feed	,,	2 0⅛	3 5⅛	3 2½	1 9½	2 2⅛	2 10¾
Maize	,,	2 7	4 4	3 0	2 1¼	2 7¾	3 3
Hay	ton	95 5	111 5	117 1	71 8	77 1	78 9
Straw	,,	33 1	48 9	52 6	28 4	31 3	33 0
Peas	bushel	3 5⅝	4 2½	4 2⅜	2 8	3 6⅛	3 8¼
Potatoes	ton	92 3½	101 1¾	54 4¾	41 4	132 1½	122 3¾
GROUP IV. DAIRY PRODUCE—							
Ham	lb	0 9¼	0 11⅛	0 10⅞	0 10¼	0 9⅜	0 9⅜
Bacon	,,	0 7¼	0 8⅞	0 9⅛	0 7⅝	0 6⅛	0 6⅞
Cheese	,,	0 7¼	0 8⅞	0 7⅛	0 5	0 8⅛	0 7⅛
Butter	,,	1 0⅞	1 2⅜	0 11⅛	0 9⅝	0 11⅝	0 11⅛
Lard	,,	0 6	0 8¼	0 6⅛	0 4¼	0 4¾	0 5⅛
Eggs	dozen	0 11¼	1 0	1 1¼	0 10¼	0 9⅞	0 9¾
Honey	lb.	0 3¼	0 3⅝	0 3¼	0 3¼	0 2⅞	0 3
GROUP V. GROCERIES, &c.—							
Currants	lb.	0 6⅞	0 4¼	0 3⅞	0 3⅞	0 3⅞	0 4¾
Raisins	,,	0 7⅝	0 7⅛	0 6⅝	0 5⅛	0 5⅞	0 6⅛
Herrings	doz. 1 lb tins	6 0⅝	5 2⅜	4 7⅜	4 2⅝	3 11⅜	4 2½
Salmon	,,	7 9¼	6 5⅞	6 4⅜	6 11½	6 9¼	6 5
Sardines	doz. hlvs	5 9¾	4 11½	5 1⅛	4 7½	4 3¼	4 10½
Tea	lb.	0 11¼	0 7⅝	0 7¾	0 7½	0 7¼	0 7⅜
Coffee	,,	1 0¼	1 5⅛	1 1½	1 2⅛	1 1¾	1 1½
Cocoa	,,	1 2⅛	1 1½	1 1⅛	1 1⅛	1 0	1 0
Sugar	ton	457 6	411 8	408 1	402 10	435 1	401 7
Macaroni	lb.	0 5⅞	0 5¼	0 5⅝	0 5¾	0 5⅛	0 5
Sago	,,	0 1⅝	0 1⅞	0 1⅜	0 1⅝	0 1½	0 2¾
Rice	ton	443 0	463 6	462 0	450 9	445 0	452 0
Salt—Fine	,,	76 7	70 0	70 0	67 6	67 6	67 6
Rock	,,	50 11	58 3	50 7	42 6	46 5	33 0
Mustard	doz. 1 lb. tins	17 11⅜	18 5⅛	18 6	18 2¼	18 0	18 0
Starch	lb.	0 4¼	0 4¾	0 4⅞	0 5½	0 5	0 5
Blue	,,	0 8⅛	0 7¼	0 7¼	0 7¼	0 7¼	0 7½
Matches	gross	1 4	1 8⅞	1 8⅛	1 9¾	1 10½	1 10¼
Candles	lb.	0 6⅞	0 6½	0 6⅛	0 6⅜	0 6	0 6⅜
Kerosene	gallon	0 10¼	0 7¾	0 8⅜	0 8	0 8¼	0 8⅞
Tobacco	lb	4 7½	4 9	4 9	4 9	4 9	4 7⅞
GROUP VI MEAT—							
Beef	100 lb.	27 11	31 1¼	28 5¼	23 3¾	21 5½	21 7¾
Mutton	lb.	0 2⅞	0 3	0 3⅛	0 3¾	0 3	0 2¾
Lamb	each	9 4¾	8 5¾	9 10¼	11 1¾	10 4	9 3¼
Veal	lb.	0 2⅝	0 2⅜	0 2⅜	0 2⅞	0 2⅛	0 2⅜
Pork	,,	0 4¾	0 5⅞	0 6⅜	0 5⅜	0 4⅛	0 4¼
GROUP VII. BUILDING MATERIAL							
Timber—Flooring—6 x 1¼	100ft. lin	9 6	10 0	10 4⅝	10 4	9 4⅜	9 0¼
6 x ⅞	,,	7 3¾	8 0	8 9¾	8 8	7 3	7 8¾
6 x ¾	,,	6 8½	7 0	7 3¾	7 4½	6 6½	6 6
6 x ½	,,	4 10	5 3	5 8	5 6	4 6¾	5 1
Weatherboards ..	,,	4 11⅞	5 6	6 0¾	6 1⅝	5 5⅛	5 10¼
Oregon	1000ft sp	115 5	110 1	120 2	109 1¼	103 3	127 1
Shelving	,,	228 0	232 10½	236 8	231 8¾	239 7	255 0
Cement	cask	14 10	13 1¼	12 0	11 10	12 2	11 5¼
White Lead	ton	691 6	581 6	530 0	532 1	508 1	553 6
GROUP VIII. CHEMICALS—							
Cream of Tartar	lb.	0 9⅞	0 9⅜	0 10	0 9½	0 8⅞	0 8⅜
Carbonate of Soda ..	ton	144 11	138 4	134 6	138 3	163 2	180 0
Saltpetre	,,	520 0	506 2	527 8	488 1	478 1	490 9
Sulphur	,,	183 4	184 7	166 4	158 6	161 2	161 6

Average Annual Wholesale Prices in Melbourne, 1871 to 1912—contd.

Commodity.	Unit	1907.	1908.	1909.	1910.	1911.	1912.*
		s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Group I. Metals—							
Iron—Pig Mixed Nos.	ton	81 3	79 5	79 5	81 0	81 2	82 2
Rod and Bar	,,	201 5	204 3	195 9	195 4½	191 2	210 9
Angle and Tee	,,	211 5	215 0	205 0	197 8	195 0	201 3
Plate	,,	211 5	213 5½	195 2	192 1½	192 6	200 3
Hoop	,,	210 6¼	216 11	212 8	209 7¼	203 10	211 6
Galvanised Corrugated	,,	393 2¾	370 0	366 4	354 8¼	347 5	354 6
Wire, Fencing	,,	175 7½	155 3½	162 2	171 4	169 3	156 10½
Zinc—Sheet	,,	761 5	667 8	613 10	601 6½	673 10	729 6
Lead—Sheet	,,	465 8¼	366 2	341 2	322 1½	315 11	377 6
Piping	,,	490 8¼	430 4½	421 2	405 3	387 3	419 4
Copper—Sheet	lb.	1 1⅛	0 11⅞	0 10⅝	0 9⅝	0 9¼	0 9⅞
Coal (on Wharf)	ton	21 6	22 6	22 6	22 6	22 6	22 6
Group II Textiles, Leather, &c							
Jute Goods—Branbags	dozen	5 3	4 4⅝	3 8¼	3 5⅛	4 0¼	5 11
Cornsacks	,,	7 0	5 6¼	4 9⅝	4 9¼	5 3½	5 7⅞
Woolpacks	each	2 8⅞	2 3	2 1	2 1⅞	2 4⅝	2 8⅝
Leather—Kip	lb.	1 6	1 5⅝	1 5	1 6⅞	1 7⅛	1 7
Calf	,,	2 3½	2 3⅛	2 3⅛	2 3⅞	2 4⅝	2 4½
Basils	dozen	25 0	23 10⅛	22 6	20 7	20 0	20 0
Cotton—Raw	lb	0 7⅛	0 6¼	0 6⅝	0 8¾	0 7¾	..
Silk—Raw	,,	15 4¼	12 0½	11 6	11 10¼	11 10	..
Wool	,,	0 11⅛	0 9⅝	0 10⅛	0 10⅞	0 10⅝	..
Group III. Agricult'l Produce							
Wheat	bushel	3 9	4 2	4 7	3 10¼	3 6¼	4 0⅝
Flour	ton	168 10	179 3	206 11	180 9	160 5	175 4¼
Bran	bushel	0 10⅛	1 2¼	0 10½	0 10⅞	0 11¼	1 2
Pollard	,,	0 10⅝	1 2⅛	1 0⅜	0 10⅞	0 11½	1 2⅞
Oats	,,	2 8	2 11	2 2¼	2 4¾	2 4½	3 3⅛
Oatmeal	ton	323 6	383 6	291 11	302 4	311 10	414 6
Barley—Malting	bushel	4 6¾	4 11¼	3 11	4 1	4 9	6 1
Feed	,,	2 9	3 8¼	2 5¾	2 4	2 6	4 9⅛
Maize	,,	3 2	4 3	3 11⅛	2 7⅜	2 9⅛	4 1¼
Hay	ton	93 9	137 6	85 5	87 1	98 9	117 9
Straw	,,	38 4	56 6	41 3	34 7	32 11	36 5
Peas	bushel	3 4¾	3 11¼	4 6⅜	4 10⅝	3 11¼	4 1
Potatoes	ton	50 8	86 9¾	75 9½	98 5½	80 7½	157 6
Group IV Dairy Produce—							
Ham	lb.	0 10⅝	0 11¼	1 0⅛	1 0¼	0 11¾	1 0⅛
Bacon	,,	0 7¾	0 8¾	0 8¼	0 7⅞	0 6¾	0 9⅜
Cheese	,,	0 7¾	0 10	0 8¾	0 7⅛	0 7⅝	0 10⅛
Butter	,,	0 11¾	1 1⅞	1 0¾	0 11⅜	0 11⅛	1 2⅛
Lard	,,	0 5¾	0 8⅛	0 6⅛	0 6⅛	0 5⅝	0 6¾
Eggs	dozen	0 10⅝	1 0¼	1 0⅜	0 11⅛	1 0	1 2
Honey	lb	0 2¾	0 3⅛	0 3	0 3¼	0 3	0 3¼
Group V Groceries, &c.—							
Currants	lb.	0 5¼	0 5⅝	0 5⅛	0 5¾	0 5⅞	0 5¾
Raisins	,,	0 7¼	0 6¾	0 6½	0 6¾	0 6⅝	0 6¾
Herrings	doz 1 lb tins	4 9¼	4 6¾	4 6¼	4 6⅝	4 5⅞	4 6
Salmon	,,	6 1⅛	7 0⅝	6 10⅛	7 4⅝	8 10⅝	9 7⅜
Sardines	doz ,, hlvs	5 0⅛	5 0	5 1¼	5 0	5 1½	5 1½
Tea	lb.	0 8⅛	0 8	0 8¼	0 8¼	0 9	..
Coffee	,,	1 1½	1 1⅛	1 1⅛	1 1⅛	1 1⅛	1 2⅛
Cocoa	,,	1 0⅞	1 1½	1 1⅛	1 1½	1 1⅛	1 1½
Sugar	ton	395 4	413 6	426 6	448 0	437 6	480 6
Macaroni	lb.	0 5¼	0 5¾	0 5¼	0 5½	0 5¾	0 3¼
Sago	,,	0 3	0 1⅞	0 1⅞	0 1¾	0 2⅛	0 2¼
Rice	ton	498 0	507 4	495 0	486 2	466 2	526 0
Salt—Fine	,,	70 2	75 6	81 3	81 3	81 3	81 3
Rock	,,	49 11	60 2	48 1	43 3	46 3	50 6
Mustard	doz 1 lb. tins	18 4¼	19 0	19 0	19 0	19 0	19 0
Starch	lb.	0 5	0 5	0 5	0 5	0 5	0 5
Blue	,,	0 7⅝	0 8⅜	0 8⅛	0 8⅜	0 8½	0 8⅜
Matches	gross	2 4½	2 8¾	2 5⅞	2 2⅞	2 1	2 1¼
Candles	lb.	0 7¼	0 7¼	0 7¼	0 7¼	0 7¼	0 7¼
Kerosene	gallon	0 9¼	0 9⅛	0 9⅛	0 9⅛	0 9⅞	0 10⅛
Tobacco	lb.	4 7¼	4 7¼	4 7¼	4 7¼	4 7¼	4 10¼
Group VI. Meat—							
Beef	100 lb.	26 3½	28 3¾	23 0¼	19 9½	18 10	24 6
Mutton	lb.	0 2⅞	0 2⅝	0 2	0 2	0 2½	0 3
Lamb	each	9 1⅜	9 2¼	8 3¾	8 0⅝	8 10½	9 10⅞
Veal	lb.	0 2⅛	0 2¼	0 2	0 2	0 2	0 2⅜
Pork	,,	0 5	0 5⅝	0 6	0 5¼	0 4⅜	0 4¼
Group VII. Building Material							
Timber—Flooring—6 x 1¼	100ft lin	10 4	10 3¾	10 3½	10 11½	11 0	11 0⅜
6 x ⅞	,,	8 4	7 11	8 1½	9 7½	8 9⅞	8 5⅜
6 x ¾	,,	7 5⅜	7 2	7 1⅝	8 1½	8 0½	7 7
6 x ½	,,	5 3¼	5 1¾	5 3	6 0¼	5 9⅝	5 5⅜
Weatherboards	,,	6 2⅞	5 9¾	5 6½	7 0	6 7½	6 1½
Oregon	1000ft sp	134 8	113 10	107 3¾	111 3	118 3	131 11½
Shelving	,,	280 8¼	305 0	306 6½	330 0	325 5	335 0
Cement	cask	12 0⅝	12 11	11 11¼	12 8	13 5	14 8
White Lead	ton	629 3	685 5	560 5	567 8	602 4	713 6
Group VIII Chemicals—							
Cream of Tartar	lb	0 9⅞	0 9	0 8	0 9¼	0 10⅝	0 9⅝
Carbonate of Soda	ton	186 9	182 1	162 6	164 9	167 6	166 6
Saltpetre	,,	597 10	582 8	592 4	660 0	660 0	660 0
Sulphur	,,	175 8	160 0	166 2	160 9	173 1	192 6

* First 9 Months.

APPENDIX VII.

FORMS USED FOR COLLECTION OF DATA AS TO RETAIL PRICES AND HOUSE RENT.

Town ______ State ______

Office No. R.P. 21

RETAIL PRICES.

Name ______

Address ______

This half-sheet is to be detached and posted to the "Commonwealth Statistician," Melbourne.

In filling in this form please follow Instructions carefully.

January, 191...

ARTICLE		UNIT OF QUANTITY	Predominant or Most Frequent Price † s.	d.
Bread		Per 2-lb loaf		
Butter		" lb		
Cheese	New	" lb.		
	Matured	" lb		
Eggs	New laid	" dozen		
	Fresh	" "		
Flour	Ordinary	" 25-lb bag		
	Self-raising	" * .. lbs packet		
Tea		" lb.		
Coffee		" lb		
Cocoa		½ lb		
Bacon	Middle cut	" lb		
	Shoulder	" lb		
	Ham	" lb		
Sugar (white granulated A1)		" * lbs		
Rice		" lb		
Sago		" lb.		
Jam (Australian)		" *......lbs tin		
Oatmeal		" *... ..lbs.		
Raisins		" lb		
Currants		lb		
Starch		" lb		
Blue		" dozen squares		
Candles		lb		
Soap (household, ordinary)		" * lbs bar		
Potatoes		" 14 lbs		
Onions		" lb		
Kerosene		" gallon		

* Enter quantity most frequently sold.
† See instructions paragraph 4.

REMARKS (Enter here the cause of any material advance or decline in the price of any article since the middle of last month).

______

(Continue remarks on back of sheet, if necessary.)

Town ______ State ______

Office No. R.P. 31

RETAIL PRICES.

Name ______

Address ______

This quarter-sheet is to be detached and posted to the "Commonwealth Statistician," Melbourne.

In filling in this form please follow Instructions carefully.

January, 191

Particulars		Cash Price d.
Milk	per quart	

REMARKS (Enter here the cause of any material advance or decline in the price of any article since the middle of last month).

______

Town ______ State ______

Office No. R.P. 21

RETAIL PRICES.

Name ______

Address ______

This half-sheet is to be detached and posted to the "Commonwealth Statistician," Melbourne.

In filling in this form please follow Instructions carefully.

January, 191 .

ARTICLE		Predominant or Most Frequent Price * s.	d.
Beef (fresh) Sirloin	per lb		
Ribs	"		
Flank	"		
Shin (without bone) Gravy Beef	"		
Steak—Rump	"		
Shoulder	"		
Stewing (Buttock)	"		
Beef (Corned)—Round	"		
Brisket (with bone)	"		
" (without bone	"		
Mutton—Legs	"		
Shoulders	"		
Loins	"		
Necks	"		
Chops—Loin	"		
Leg	"		
Neck	"		
Lamb—Forequarter	"		
Hindquarter	"		
Pork (fresh)—Leg	"		
Loin	"		
Belly	"		
Chops	"		

* See instructions paragraph 4.

REMARKS (Enter here the cause of any material advance or decline in the price of any article since the middle of last month).

______

(Continue remarks on back of sheet, if necessary.)

Town ______ State ______

District or Suburb ______ Office No. R.P. 161

WEEKLY HOUSE RENTS

Particulars required under the Census and Statistics Act, 1905.

Name of Agent ______

Address ______

This slip is to be detached and posted to the "Commonwealth Statistician," Melbourne.

In filling up this form please follow Instructions carefully.

RETURN FOR QUARTER ENDING 30th MARCH, 191

Nature of House	Under 4 rooms s.	d.	4 Rooms s.	d.	5 Rooms s.	d.	6 Rooms s.	d.	7 Rooms s.	d.	8 Rooms and over s.	d.
Wood												
Brick, &c.												

REMARKS.—(Enter here the cause of any advance or decline in rents since the preceding quarter) ______

______

(Continue remarks on back of sheet, if necessary.)

APPENDIX VIII.

THEORY OF DETERMINING PRICE-INDEXES SHEWING VARIATIONS IN THE EXCHANGE-VALUE OF GOLD, OR IN THE COST OF LIVING.

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SYNOPSIS.

1. General theory of determining price-indexes.
2. Price-indexes from relative total expenditures and from price-ratios.
3. Arithmetic, geometric, and harmonic means.
4. The harmonic mean is really as legitimate as the arithmetic, but is not more so.
5. Weights to be applied when price-ratios are used.
6. Computations of mean weights.
7. Error of means.
8. Index-numbers referred to average conditions during a period.
9. Differences between various price-indexes.
10. Various methods adopted for measuring the exchange-value of money.
11. Supposed defects in the geometric mean.
12. The aggregate expenditure method the best.
13. Conclusion.

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1. **General Theory of Determining Price-Indexes.**—The *exchange-value* or *purchasing-efficiency* of money is measured by the amount of any commodity which a unit of money (£1 say) will purchase; or it is measured in a reciprocal way by the amount of money or *price* which has to be paid for a unit of the commodity in question. The latter measure is, of course, a reciprocal of the former, that is, the exchange-value or money-purchasing efficiency of the commodity is measured by the quantity of money which a unit of the commodity will buy, or for which it can be exchanged. It is convenient, and is the custom, to express exchange-values through price. When the price of a commodity changes (for example, when it becomes greater) it denotes change of (reduced) efficiency in the purchasing-power or exchange-value of money with respect to that commodity. Thus if a thing that originally cost £4, at some later date costs £5, the *price* has *advanced* in the ratio from 1 to $\frac{5}{4}$ or 25%, or the efficiency of the *purchasing-power* or exchange-value of money has, in respect of the commodity in question, *fallen* from 1 to $\frac{4}{5}$, or 20%, the two statements being virtually the same. The ratio of the price at one date to that at another is called its *price-ratio* in respect of those dates. It has become customary for economists to regard every instance of a rise or fall in price in a particular commodity as an *individual measure of a variation in the exchange-value of money*, a measure which has value or weight in proportion as expenditure upon the commodity in question enters into the aggregate of expenditure upon the whole series of commodities of which it forms a single member. The term "exchange-value" is to be preferred because it is unambiguous; "value" without qualification might denote utility-value, esteem-value, cost-value, etc. Here it may be remarked that the method of determining variations of the exchange-value of gold by means of price-ratios, is not a good one, as is shewn hereinafter, and the only satisfactory method is that of aggregate expenditures for a given regimen.

Now it is obvious that if, in a series of commodities, the quantity used in a given period be constant for each commodity, the measure of the economic importance or *economic* "*weight*" of each is the relative expenditure in money units on that member of the series.* Hence through statistics we may obtain some idea of this measure or "weight." Weight in this sense has, of course, no direct connection with physical weight.

When prices have changed, however, the "weights" will have changed also, unless the quantities of the commodities have changed so as to leave the expenditures (or quantities multiplied by the price) the same. Ordinarily it may of course be said that the "weights" will have changed. Now there can be no *real* comparison of the relative purchasing-power or exchange-value of money, except on some supposition of constancy in human requirements, and just in proportion as the usage of different commodities varies so will any estimate of relative purchasing-power become dubious. In short, a fixed regimen is essential for an accurate determination.

In some instances human requirements are fairly constant. If we suppose that, for an "average" member of the community, a *particular regimen be adhered to*, then clearly we may tabulate the aggregate expenditure on that regimen at two dates; and the expenditure thereon at the later date, divided by the expenditure at the former, will measure the *expenditure-ratio* for the two dates. Thus, for example, if we suppose it to *increase*, it will represent a *rise* in the cost of the commodities. The reciprocal of this ratio or relative increase measures the decrease in the purchasing-power of money with respect to the particular regimen.

If the regimen itself vary, any computation of the change in question is dubious, *because it contains two elements*, viz. :—

(i.) Change in the regimen itself, *i.e.*, change in the use of the commodities (or *standard of living*), and

(ii.) Change in the expenditure on the cost of the individual elements in the regimen.

Where the regimen changes either in virtue of the changes in price, arbitrarily, or in response to changes in the "standard of living," etc., there are still *assumptions by means of which accurate comparisons can be made*. Thus we may make several definite suppositions, for example :—(*a*) that the quantities at the former date apply to the later, and thus compute what the effect of changed price would be; or (*b*) we may, on the other hand, suppose that the quantities used at the second date were actually those at the earlier date, and can again compute the aggregate cost of the regimen on this assumption. Both of these comparisons are, in their way, valid, intelligible, and respond to certain questions of sociological importance that from time to time arise, and which for certain purposes demand an answer. The best *general* assumption (*c*) is, of course, that some mean-value of the "weights" applies: this mean may be arithmetic, geometric, or harmonic; and any one of these means may naturally arise. It is shewn hereinafter that the geometric mean is doubtless the most accurate generally, but that in certain cases the arithmetic may be used.

If we have price-ratios for a series of commodities, and deduce from them some general ratio that expresses for the series in question the price on the whole at the second date, as compared with the former, such a ratio is called the *price-index* of the latter date.

The nature of the combination of the price-ratios in the calculation of a price-index, even when the relative weights are decided, is a matter for consideration. It is essential, for example, for satisfactory comparisons that a series of price-indexes which profess to express changes in the purchasing-power of money shall furnish the same relation between the purchasing-power at any two dates, as would be furnished by calculating by the method approved from the original data for the two dates. If this were not so, then obviously the index-numbers do not fulfil their profession; in short, they are misleading.

Index-values, as ordinarily furnished, are unfortunately subject to this criticism, viz., that they cannot, in the nature of the case, be assumed to represent intelligibly the relation required, at least with *sufficient* precision to answer many practical questions. This may be readily seen by comparing any two series of price-indexes.

2. **Price-Indexes from Relative Total Expenditures and from Price-Ratios.**—For a series of *commodities* A, B, C, the *price* at a certain date is a_0, b_0, c_0, etc.; at some later date it is a_1, b_1, c_1, etc. The *quantities* of these commodities may be denoted by α, β, γ, etc., with suffixes 0 and 1 according to the date. The *unit* by which any commodity A, B, or C, etc., is measured may of course be anything whatever,

* Forasmuch as the money-unit constitutes a unique common measure of exchange-values.

as a pound avoirdupois, a gallon, a gross, an article, etc. The *price-ratio* at the latter date as compared with the former ordinarily varies with the commodity used to determine it. Thus it may be written :—

$$(1) \ldots\ldots\ {}_0p_1 = \frac{a_1}{a_0};\quad {}_0q_1 = \frac{b_1}{b_0};\quad {}_0r_1 = \frac{c_1}{c_0};\ \text{etc.},$$

according as commodity A, B, or C, etc., is used. In attempting to utilise these price-ratios p, q, r, etc., for any general deduction, the *relative-weight* which should be ascribed to each obviously demands consideration. If the quantities or *mass-units* used were *identical at each date*, and were, say, α, β, γ, etc., we should have a general price-ratio I, determined as follows, viz. :—

$$(2) \ldots\ldots\ {}_0I_1 = \frac{P_1}{P_0} = \frac{\alpha a_1 + \beta b_1 + \gamma c_1 + \text{etc.}}{\alpha a_0 + \beta b_0 + \gamma c_0 + \text{etc.}}$$

P_0 and P_1, denoting total expenditure on commodities A, B, C, etc., and ${}_0I_1$ the deduced *general price-index* for the dates in question. This formula is one which, for example, would give the *relative cost of living* at the two dates, on the assumption that the commodities, A, B, C, etc., represented the standard of living, and that the quantities of them which were consumed were identical at the two dates. The formula given (2) is unquestionably the only proper formula to use in such a case, and it may be shewn that it is the best formula in all cases. See hereinafter.

To clearly illustrate the matter, suppose, for example, that at the two dates this consumption for some given unit of time was, let us say, uniformly ten 4-lb. loaves, 1 pound of tea, and 5 quarts of milk.* Suppose further that the prices at date 0 were respectively 5d. per loaf, 15d. per lb., and 6d. per quart, and at date 1 6d. per loaf, 24d. per lb., and 4d. per quart. Then on this assumption the actual cost of living (so far as these items are concerned) would have risen from 95d. to 104d., that is in the ratio of 100 to 109.47, or in other words, there would be a 9.47% increase in the "cost of living."†

A method very commonly employed, however, for estimating changes of this kind is to ascertain the *price-ratio* for each commodity, that is, to find the quantities p, q, r, etc., by dividing the price per unit at the second date by that at the first, and to take a mean of all for a general result.‡ The price-ratio is, of course, independent of the size of the unit. These quotients are commonly multiplied by 100 for mere convenience.

As reliance upon price-ratios and combinations of them is very common, the question will be referred to at some length.

If price-ratios were really of equal weight we should have

$$(3) \ldots\ldots\ I' = \frac{1}{n}\ (p + q + r + \text{etc. to } n \text{ terms});\ \text{or}$$

$$(4) \ldots\ldots\ I'' = \sqrt[n]{\ }\ (p.\ q.\ r.\ \text{etc. to } n \text{ terms});\ \text{or}$$

$$(5) \ldots\ldots\ I''' = \frac{1}{\frac{1}{n}\left(\frac{1}{p} + \frac{1}{q} + \frac{1}{r} + \text{etc.}\right)} = \frac{n\ (p.\ q.\ r.\ \text{etc.})}{(qr\ldots)+(pr\ldots)+(pq..)+\text{etc.}}$$

according as we preferred the *arithmetic*, the *geometric*, or the *harmonic* mean. Which of these is to be preferred is a point to which we shall refer later. The arithmetic, geometric and harmonic means all assume that each commodity is of equal importance in the result, but which is the proper one to adopt depends on other considerations of a more complex character. Popularly the arithmetic mean, viz., the ordinary average, is supposed to be satisfactory, but this is an error arising ordinarily from the fact that what underlies such an assumption is not apparent. Taking

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* The consumption per head per annum is about 32 loaves of bread, 3 lbs. of tea, and 16 quarts of milk.

† Here it may be mentioned that computed from the geometric mean of the price-ratios, weighted according to the arithmetic mean of the weights, we should obtain 109.53. See next section.

‡ This method is wholly unsatisfactory.

the example just quoted, and regarding the evidence of each commodity as to rise of price as of equal value, we should have the following results according as we take one or the other mean, viz. :—

	Arithmetic Mean.		*Geometric Mean.*		*Harmonic Mean.*
(A)	1.20		1.20		$\frac{5}{6}$
(B)	1.60		1.60		$\frac{15}{24}$
(C)	0.6667		0.6667		$\frac{6}{4}$
Sum	3.4667	Product	1.280	Sum	$\frac{71}{24}$
(Divisor 3.)		(Root, Cube)		(Divisor 3)	
		100 × Result, Cube Root		Quotient	$\frac{71}{72}$
100 × Quotient,	115.56		108.58	100 × Reciprocal	101.41

Result by ratio of aggregate of expenditures = 109.47.

Thus we have four results, viz., by formula (2), viz., the ratio of total expenditure 109.47%; by formula (3) based on the unweighted arithmetic mean 115.56; by formula (4) based on the unweighted geometric mean 108.58; and by formula (5) based on the unweighted harmonic mean 101.41. And it may be added that had we used formula (2) with *one* unit of each (*i.e.*, $\alpha = \beta = \gamma = 1$) we should have obtained the result 130.77%, or 30.77% increase, and further that by a method given hereinafter we should obtain 109.53.

The illustration shews conclusively that the *weight* assigned to each is of great importance, but before dealing with this it is necessary to consider how several means can arise in determining price-indexes by means of price-ratios.

3. Significance of Arithmetic, Geometric, and Harmonic Means of Price-Ratios.—That there may be different *means* has already been referred to. A word is necessary as to their nature. When an increment to any quantity is uniform and independent of the magnitude of the quantity itself, that is, when it is dependent merely upon the interval of time elapsing, and is equal for equal times, then the progression is *arithmetic*. This is expressed by the following, viz. :—

$$(6) \ldots\ldots (a);\quad a + \frac{b-a}{2} = \left(\frac{a+b}{2}\right);\quad \frac{a+b}{2} + \frac{b-a}{2} = (b);$$

the common difference being $\frac{1}{2}(b-a)$, and the quantity $\frac{1}{2}(a+b)$ being the arithmetic mean of a and b. Often, however, in the nature of the case the magnitude of the increase is actually *dependent* on the magnitude of the quantity to which it is added; for example, compound interest on money, that is, the *rate of increase*, is constant: then the progression is geometric, for example :—

$$(7) \ldots\ldots (a);\ a \times \sqrt{\frac{b}{a}} = (\sqrt{ab});\quad \sqrt{ab} \times \sqrt{\frac{b}{a}} = (b),$$

the common ratio being $\sqrt{(b/a)}$ and $\sqrt{(ab)}$ denoting the geometric mean of a and b. We thus see that the square-root of the product of a and b is the mean value, when a increases to b *at a constant rate* on the increasing quantity. There is another important way in which a quantity can grow. Suppose a, in the fraction $\frac{1}{a}$, increases (or diminishes) to b, in the fraction $\frac{1}{b}$, *independently* of the magnitude of a (or of b) Then we have :—

$$(8) \ldots\ldots \left(\frac{1}{b}\right);\ \frac{1}{b - \frac{b-a}{2}} = \left(\frac{1}{\frac{1}{2}[a+b]}\right);\ \frac{1}{b - 2\left(\frac{b-a}{2}\right)} = \left(\frac{1}{a}\right)$$

Multiply these by ab and we get :—

$$(9) \ldots\ldots (a);\quad \left(\frac{2ab}{a+b}\right);\ \text{and}\ (b)$$

Then either series of the quantities in the brackets in (8) or (9) are in harmonic progression, formula (8) giving the form in which the progression arises in question of change in price-ratios, formula (9) that which is usually given as the harmonic mean between a and b.

4. **The Harmonic Mean is really as legitimate as the Arithmetic, but is not more so, and both are invalid.**—The question of the legitimacy of employing either the arithmetic or the harmonic or the geometric method of arriving at a price-index may readily be illustrated by means of examples. It may be premised that if, at the beginning of a period of time, the price-index be taken as unity, and at the end of the period it is found by any process to be, say I, then, starting at the end of the period with a price-index of unity, and working back by the same process, one should arrive at $1/I$ as the price-index at the beginning. In other words, to have any definite meaning *the ratio between the two index-numbers should always be maintained if the scheme of calculation be arithmetically valid.* With this principle as a crucial test, the question arises which, if any, of the three methods of arriving at price-indexes will satisfy the test. Taking the same example as before, where three commodities, whose starting price is unity, changed in price until they stood respectively at 1.20 : 1.60 : and .6667 or $\frac{6}{5}$, $\frac{8}{5}$, and $\frac{2}{3}$ we have—

$$\text{Arithmetic Mean} = \frac{1}{3}\left(\frac{6}{5}+\frac{8}{5}+\frac{2}{3}\right) = 1.1556.$$

$$\text{Geometric Mean} = \sqrt[3]{\left\{\frac{6}{5}\cdot\frac{8}{5}\cdot\frac{2}{3}\right\}} = 1.0858.$$

$$\text{Harmonic Mean} = \frac{3}{\frac{5}{6}+\frac{5}{8}+\frac{3}{2}} = 1.0141.$$

Consequently the new index-numbers are respectively 1.1556, 1.0858, and 1.0141. The reciprocals of these numbers are respectively 0.8654, 0.9210, and 0.9861. Consequently if the process of obtaining the index-numbers be reversed, and we start at the end of the period, assuming that the corresponding index-number is unity, and then work back to the beginning by the three processes, we ought to find that the arithmetic gives 0.8654 as the price-index at the start, the harmonic process ought to give 0.9861, and the geometric ought to give 0.9210. We will see now what actually *does* happen. Our three price-ratios become $\frac{5}{6}$, $\frac{5}{8}$ and $\frac{3}{2}$.

$$\text{Arithmetic Mean} \quad \frac{1}{3}\left(\frac{5}{6}+\frac{5}{8}+\frac{3}{2}\right) = 0.9861, \text{ instead of } 0.8654.$$

$$\text{Geometric Mean} \quad \sqrt[3]{\left\{\frac{5}{6}\cdot\frac{5}{8}\cdot\frac{3}{2}\right\}} = 0.9210, \text{ as before } 0.9210.$$

$$\text{Harmonic Mean} = \frac{3}{\frac{6}{5}+\frac{8}{5}+\frac{2}{3}} = 0.8654, \text{ instead of } 0.9861.$$

We thus see that the arithmetic process gives the result expected from the harmonic process, and the harmonic, the result expected from the arithmetic; but the geometric process gives the result expected from that process. That is, neither the arithmetic nor the harmonic process is reversible, and *this is a grave defect, in fact a fatal one, as regards their practical use.* The geometric process alone satisfies the indicated test of consistency.

5. **Weights to be applied when Price-ratios are used.**—Attention may now be given to the important question of *weighting*, if price-ratios are used. It is obvious that relative units of quantities used in the same period must be employed with the method of expenditures; formula (2). Reverting to the original illustration, we may further consider the case of the three commodities whose prices, starting at

unity at date 0, become respectively 1.20 : 1.60 : and 0.6667 at date 1. We shall denote the *weights* by u, v, w, etc.; they measure relatively the *expenditure* on the corresponding commodities. Three courses may be adopted.

(i.) The price-ratios can be weighted according to the respective expenditures at date 0.*

(ii.) The price-ratios can be weighted according to respective expenditures at date 1.*

(iii.) The price-ratios can be weighted according to some *mean* of the two expenditures. Of these mean-weights, there are only three which it is at present proposed to consider, viz., those already referred to (a) the arithmetic, (b) the geometric, and (c) the harmonic.*

These deduced mean-weights (iii$a$), (iii.b) and (iii.c) can be computed by formula (3), (4), and (5) if we substitute u, v, and w for p, q, and r therein, and the different weights, computed in the way indicated, are shewn in the following table :—

Method.	Expenditures as at—	Weights.		
		u	v	w
(i.)	Date 0	50	15	30
(ii.)	Date 1	60	24	20
(iii.a)	Arithmetic mean, dates 0 and 1	55	19.5	25
(iii.b)	Geometric mean, dates 0 and 1	54.77	18.97	24.49
(iii.c)	Harmonic mean, dates 0 and 1	54.55	18.46	24

The respective index-numbers, computed as by formula (10) hereinafter, viz., that which is most commonly used, are given by the amounts

$$\frac{(50 \times 1.20) + (15 \times 1.60) + (30 \times 0.6667)}{50 + 15 + 30},$$

and four other similar expressions. Their values multiplied by 100 are:

Index according to—

(i.) = 109.47† ; (iii.a) = 114.44 ; (iii.c) = 114.41.

(ii.) = 118.97 ; (iii.b) = 114.43 ;

The last three results, though worthless, are almost identical, but (iii.b) and (iii.c) would, of course, not be employed with formulæ (3) or (10) hereafter. Given the weights to be adopted, we may now consider the question how the price-index should be computed if price-ratios are used at all. We may remark that a "weighted mean" is the mean that would be obtained by regarding each item as repeated the number of times indicated by the weight number.

Let the weights corresponding to commodities A, B, and C (or to the price-ratios p, q, and r) be denoted by u, v, and w.

Then instead of formulae (3), (4) and (5), we have, using J (instead of I) to denote a *weighted-mean*, the following formulae, according to whether we employ the arithmetic, geometric, or harmonic mean :

$$(10) \ldots\ldots J' = \frac{1}{(u + v + w + \text{etc.})} (up + vq + wr + \text{etc.})$$

$$(11) \ldots\ldots J'' = \left\{ p^u \cdot q^v \cdot r^w \cdot \text{etc.} \right\}^{\frac{1}{u + v + w + \text{etc.}}}$$

$$(12) \ldots\ldots J''' = \frac{u + v + w + \text{etc.}}{\frac{u}{p} + \frac{v}{q} + \frac{w}{r} + \text{etc.}}.$$

* It is of course evident that if this can be done it is also possible to work with the relative units used of the various commodities; thus formula (2) is more *convenient*. It is also to be preferred in every way as will hereafter be shewn.

† As given by formula (2) since the units are identical.

By taking logarithms of (11) we see that we obtain a result *analogous* in form to (10) since

$$(11a) \therefore \ldots\ldots \; log.\, J'' = \frac{1}{u+v+w+\text{etc.}} \; (u \; log.\, p + v \; log.\, q + w \; log.\, r + \text{etc.})$$

We see thus, that using the weights indicated by (iii.*b*) according to formula (11), we have

$$log.\, J'' = \frac{1}{98.23} \left\{ 54.77 \times 0.07918 + 18.97 \times 0.20412 + 24.49 \times \bar{1}.82391 \right\}$$

thus $J'' = 1.0956$; and $100\,J'' = 109.56$.*

Lastly, using the weights indicated (iii.*c*) according to formula (12) we get

$$J''' = \frac{54.55+18.46+24}{\frac{54.55}{1.2}+\frac{18.46}{1.6}+\frac{24}{0.6667}} = \frac{97.01}{92.99} = 1.0432; \text{ and } 100\,J''' = 104.32.$$

From the examples given it will be noticed that when the price-index is computed as a geometric mean, it lies between values given by the harmonic and arithmetic means, the arithmetic being the highest. Incidentally, it may be remarked that it is obvious that the weighted geometric mean will be lower than the weighted arithmetic mean, since, with numbers greater than unity and very near unity, the difference between the logarithms of numbers is much less than the differences between the numbers themselves. Thus, as we see at once from formula (11*a*), the effect of large differences of weighting must necessarily be less when the geometric mean is computed, rather than the arithmetic. That on other grounds the geometric mean is also to be preferred can be seen instantly from the fact that it incidentally gives consistent results in whatever way we work from one date to another, whereas the arithmetic and harmonic means do *not* give consistent results. By parity of process differences of value may in general be appropriately measured by their relation to the quantity which fluctuates, and this conception of rate-variation necessarily leads to the adoption of geometric means: or to put it in other words, —the moment price-variation is looked at from the standpoint of rate-differences (for example, 1d. is 10% in the case of an article the value of which is 10d., but only 5% where the value of the article is 20d.) we see at once that all measurement of change of value may quite appropriately be in *rates*, and, consequently, the geometric mode of computing may be regarded as the legitimate one where the original data are supplied in the form of price-ratios. Finally, it may be noted that the weighted geometric mean, the weights being given by (iii.*b*), in conjunction with formula (11), is 109.56, by (iii.*a*) and formula (11) is 109.53, and by the cost-of-living formula, viz. (2), is 109.47†; and further if the original weights 50, 15, and 30 for commodities A, B, and C be taken, and the weighted geometric mean of the price-ratios be calculated, we obtain 104.30 (practically identical with the harmonic result of formula (12) just given). This shews that it is by no means satisfactory to use the original weights, as is usually done in the case of price-indexes, *unless* there be reason to believe they are sensibly constant throughout.

6. **Computation of Mean Weights.**—We now reach the discussion of the general problem of which the example just given is a particular case. Suppose at date 0 the prices of a series of commodities are respectively a_0, b_0, c_0, etc.; and an amount α_0 is bought of the first, β_0 of the second, etc.; the total expenditure on the first amounting to ζ_0, on the second to η_0, etc. Suppose further that at date 1 the respective prices are a_1, b_1, etc., the price-ratios $\frac{a_1}{a_0}$, etc., are denoted by p, q, r, etc., and the total expenditures by ζ_0, η_0, etc., at date 0, and ζ_1, η_1, etc., at date 1. Then weighting the different quantities by the geometric means of the expenditures according to the geometric formula, we have, since

$$(13) \ldots\ldots \; \zeta_0 = \alpha_0 a_0; \quad \zeta_1 = \alpha_1 a_1; \text{ etc.}$$

$$(13a) \ldots\ldots \; \eta_0 = \beta_0 b_0; \quad \eta_1 = \beta_1 b_1; \text{ etc.,}$$

$$\text{etc., etc., etc., etc., etc.,}$$

for index-number at date 1,

$$(14) \ldots\ldots \; J'' = \left(p^{\sqrt{\zeta_0\zeta_1}} \cdot q^{\sqrt{\eta_0\eta_1}} \cdot \text{etc.} \right)^{\frac{1}{\sqrt{\zeta_0\zeta_1}+\sqrt{\eta_0\eta_1}+\text{etc.}}}$$

* By formula (2), viz., the ratio of the aggregate expenditures, we get 109.47; using arithmetic-mean weights and formula (11) we get 109.53.

† It is shewn hereinafter that formulæ (11) and (2) are sensibly identical when the weights and units are properly determined.

a number whose logarithm is

$$(15) \ldots\ldots log.\ J'' = \frac{\sqrt{\zeta_0\zeta_1}\ log.\ p + \sqrt{\eta_0\eta_1}\ log. q + \text{etc.}}{\sqrt{\zeta_0\zeta_1} + \sqrt{\eta_0\eta_1} + \text{etc.}}$$

Consequently when the total expenditures at any two periods are at all comparable, we may put with sufficient accuracy

$$(16) \ldots\ldots \zeta = \tfrac{1}{2}(\zeta_0+\zeta_1); \text{ and } \sqrt{\zeta_0\zeta_1} = \zeta - \tfrac{1}{8}\frac{(\zeta_1 - \zeta_0)^2}{\zeta} + \text{etc.}$$

The term $-\frac{1}{8}(\zeta_1 - \zeta_0)^2 / \zeta$ is so small as ordinarily to be negligible in nearly all practical cases, since if the expenditure were double and triple we shall have only the following percentage of error in (16), viz.,

$\zeta_0 : \zeta_1 = 1 : 2$; error $= 5.72\%$; if $= 1 : 3$; error $= 13.40\%$.

It is evident that, since in formula (11) this error of weight enters into both the numerator and denominator, its effect must be greatly reduced, and it will lead only to a very small relative error indeed. In other words, in (11) we may always take

$$(17) \ldots\ldots u = \tfrac{1}{2}(u_0 + u_1);\ v = \tfrac{1}{2}(v_0 + v_1); \text{etc.}$$

Thus in the expression for the logarithm of the index-number, viz.,

$$(\sqrt{\zeta_0\zeta_1}\ log.\ p + \sqrt{\eta_0\eta_1}\ log.\ q + \text{etc.}) / (\sqrt{\zeta_0\zeta_1} + \sqrt{\eta_0\eta_1} + \text{etc.})$$

no considerable error will be introduced by using arithmetic instead of geometric means, and the computation will be simpler. In order to illustrate this, we may revert to the former example, and consider two commodities whose price-ratios are, as before, 1.2 and 1.6 at the end of some period as compared with the beginning. Let us further take the extreme case where the expenditure on the first commodity is trebled, and that on the second commodity doubled, since this will severely test the validity of the assumption. Thus $\zeta_0 = 50$; $\zeta_1 = 150$; $\eta_0 = 15$; $\eta_1 = 30$; $log.\ p = 0.07918$; $log.\ q = 0.20412$; then the two values for the logarithm of the index-number become :—

For *log.* of geometric mean :—

$$\frac{50\sqrt{3}\ log.\ 1.2+15\sqrt{2}\ log.\ 1.6}{50\sqrt{3}+15\sqrt{2}} = \frac{86.602\ log.\ 1.2 + 21.213\ log.\ 1.6}{107.815} = 0.10376$$

For log of arithmetic mean :—

$$\frac{100\ log.\ 1.2 + 22.5\ log.\ 1.6}{122.5} = 0.10213$$

These logarithms correspond to index-numbers, which multiplied by 100, as is usual, are 126.99 and 126.51 respectively, the two results being therefore sensibly identical.

7. **Error of Arithmetic Means.**—It is worth while to investigate, on the lines of the last example, the amount of error introduced into the logarithm of the price-index by taking arithmetic instead of geometric means of expenditure.

Suppose, as before, there are two commodities whose price-ratios at date 1 are p and q as compared with unity at date 0. Suppose that the expenditures at date 1 are respectively k^2 and l^2 times expenditure at date 0.

By taking *arithmetic means* the logarithm of the price-index at date 1 becomes :—

$$log.\ J = \frac{(1 + k^2)\ log.\ p + (1 + l^2)\ log.\ q}{(1 + k^2) + (1 + l^2)}$$

By taking *geometric means*, the logarithm of the price-index at date 1 becomes :—

$$log\ J'' = \frac{k\ log.\ p + l\ log.\ q}{k + l}$$

If E denote the error introduced by taking arithmetic means,

$$(18) \ldots\ldots E = \frac{k\ log.\ p + l\ log.\ q}{k + l} - \frac{(1 + k^2)\ log.\ p + (1 + l^2)\ log.\ q}{(1 + k^2) + (1 + l^2)}$$

$$= (log.\ q - log.\ p)\ .\ \frac{k - l}{k + l}\ .\ \frac{kl - 1}{k^2+l^2+2}$$

Now we have the inequality

$$(l^2 + k^2) > 2kl;\ \text{consequently}\ (k^2 + l^2 + 2) > 2kl + 2$$

and therefore

$$(19) \ldots\ldots E < \frac{(log.\ q - log.\ p)}{2}\ .\ \frac{k - l}{k + l}\ .\ \frac{kl - 1}{kl + 1}$$

This presupposes, of course, that the initial expenditure on each commodity at date 0 was unity.

If the initial expenditures on each commodity, instead of being unity, were respectively e and f, then the expenditures at date 1 would be ek^2 and fl^2. In this case we have

$$(20) \;\ldots\ldots\; E = (log.\ q - log.\ p)\ .\ \frac{ef\,(k-l)\,(kl-1)}{(ek+fl)\,(ek^2+fl^2+e+f)}$$

In this case the inequality becomes $(ek^2+fl^2) > 2\sqrt{ef}\,.\,kl$; and $(e+f) > 2\sqrt{ef}$;

consequently $(ek^2+fl^2+e+f) > 2\sqrt{ef}\ (kl+1)$.

Also it can be shewn algebraically that if (ek^2-fl^2) and $(e-f)$ are of the same sign, as is most frequently the case, then

$$(ek+fl) > \sqrt{ef}\,(k+l)$$

for $(ek^2 - fl^2)\ (e-f) > 0$; consequently $(e^2k^2 + f^2l^2) > ef\,(l^2+k^2)$ and $(e^2k^2+f^2l^2+2efkl) > ef\,(k^2+l^2+2kl)$; and therefore

$$(ek+fl) > \sqrt{ef}\,(k+l).$$

From this analysis it is evident on reverting to (20) that

$$E < \frac{log.\ q - log.\ p}{2}\ .\ \frac{k-l}{k+l}\ .\ \frac{kl-1}{kl+1}$$

as in the former case; see (19).

A superior limit has thus been found for the error in the logarithm of the price-index. As in practical examples k and l are ordinarily nearly equal, the error is thus very small, since $k-l$ will then nearly vanish. A considerable list, viz., of about 50 commodities shews that the error is by no means inconsiderable even when the number of commodities is large.

8. **Index-Numbers referred to Average Conditions during a Period.**—We have already shewn that the best weight to be adopted in deducing the price-indexes of any two dates is in proportion to the mean of the expenditures, and that no sensible error is involved in taking the arithmetic mean, if the computation as between the price-ratios be made on the principle of the geometric mean. But the comparison of the highest value is clearly that based on the average expenditure of a longer period, since the variations of this are less marked, being free from what may be called "large accidental departures from the mean." Hence it is preferable to employ a quinquennium or decennium as basic period. And since it has been established that, for a period covering two dates, the exact nature of the determination of the mean is the weighting to be adopted (*i.e.*, whether geometric, arithmetic, etc.) is not of high importance, we may get results of a very high order of accuracy in a simple manner. Thus although a strict adherence to theory demands that the logarithms of the price-ratios should be weighted by the geometric means of the two expenditures, still a result identical for all practical purposes can be obtained by using the arithmetic means, and because of the considerable saving in computation secured by using the arithmetic mean of the weights, it is to be preferred. By similar reasoning, the proposition established can be extended to meet the case of a large number of years, instead of only two, and the conclusion is thus reached that if $\zeta_0, \zeta_1, \ldots \zeta_{m-1}$, are the expenditures at m observed periods, the general weighting may be found by taking the arithmetic mean $\frac{1}{m}\left\{\zeta_0 + \zeta_1 + \ldots . \zeta_{m-1}\right\}$, instead of the theoretically-more-accurate geometric mean $\left(\zeta_0\ \zeta_1\ \ldots .\ \zeta_{m-1}\right)^{\frac{1}{m}}$. This is really equivalent to *asserting that the basis* of the comparison of the purchasing-power of money may be the arithmetic average of the expenditure on the various commodities throughout the period under examination.

9. **Differences between various Price-Indexes.**—Price-indexes may be said, in general, to purport to represent the relative amount of money that must *on the average* be paid for commodities at successive dates, the value paid on the original date being taken as 100. Price-ratios are similar to the index-numbers, or price-indexes, but apply only to individual commodities or limited groups of commodities. Since the purchasing power of *gold* in regard to a particular commodity is an individual measure of its exchange-value (*i.e.*, of the exchange-relation between the two) it has been commonly imagined that by taking a sufficient number of commodities a general measure of all changes in the purchasing-power of gold can be

determined. In other words, it is supposed that the price-indexes represent the quantity of gold corresponding to 100 units thereof (£) at the initial date, viz., that corresponding to the 100. An examination of the various tables of price-indexes shews that attempts to measure this general relation are very unsatisfactory. To illustrate this the tables hereunder are given. They furnish the price-indexes established by various authorities by computation from various series of commodities, and it is indicated in the tables on what the estimate is based. It will be seen that there are marked divergences between individual results, so great indeed as to indicate that their value is very limited. For one example one series of indexes represents rises, while for the same period another will represent falls. The fact is this, viz., that price-indexes are definite only for a definite regimen, that is for a series of commodities used in given quantities; and the hope to obtain a general price-index which will represent in its totality the variation in the general exchange-value of gold is to expect the impossible.

No doubt for each country a series of commodities and system of weights might be taken as representing the average usage of the *entire population* in regard to these commodities. Other series of commodities and systems of weights would represent the usage of the *different classes* in the community. Both would differ as between nation and nation; consequently if any international standard is to be developed for the widest system of comparisons, the series should be common to all, and the weights should represent the average usage of the nations included. For international comparisons of classes a similar standard-series and average-weights would be required. This has been dealt with elsewhere by me. It will suffice here to observe that a system rendering general international comparisons possible, and also international comparison of classes, would have to be established by an international practice. This could be reached only by an international commission on the subject.

The following tables give the price-indexes furnished by various authorities. They disclose the fact that they are of little value to determine quantitatively small differences of the purchasing efficiency of money, the fact being that such indexes are not sufficiently well-determined to answer many social-economic questions that are arising, for example, an automatic variation of wage-determinations, which has been suggested in this country (Australia). The tables enable one to obtain an idea also of the *range of uncertainty* as among the methods adopted by different authorities.

TABLE I.—VARIOUS PRICE INDEXES, 1900-1910.
REDUCED TO 1900 VALUES AS BASIS.

Year.	A.	B.	C.	D.	E.	F.	G.	230 Com.	
	22 Com.	45 Com.		37 Com.			257 Com.	H. Weighted.*	I. Unweight'd.
1900	100	100	100	100	100	100	100	100	100
1901	99.5	96.9	101.9	93.5	96.9	95.2	98.2	100.2	98.9
1902	91.3	96.5	101.6	92.6	95.8	90.8	102.2	103.6	100.7
1903	93.3	96.9	103.2	92.6	94.2	90.7	102.8	103.7	102.1
1904	102.6	98.3	104.3	93.6	97.8	91.8	102.3	104.5	103.0
1905	99.5	97.6	103.7	96.5	98.5	91.7	104.9	107.6	105.3
1906	108.7	100.5	103.2	102.7	103.3	97.0	110.9	113.5	110.9
1907	116.9	105.7	105.8	106.2	107.7	101.9	116.3	122.1	116.6
1908	107.7	102.8	108.4	97.5	103.3	97.9	111.1	118.2	111.6
1909	102.6		108.2	99.0	105.6	94.0	114.5	119.4	112.0
1910	111.8	—	109.9	103.8	—	—	119.1	—	—

* Weighted according to table of the British Association for the Advancement of Science, 1887 to 1890

A. The Economist (Old Basis); Wholesale Prices Index Number, 1st January of each Year; 22 Commodities.
B. Board of Trade. Wholesale Prices in United Kingdom; 45 Commodities.
C. Board of Trade. Retail Prices in London.
D. Sauerbeck. Average Prices in England. 37 Commodities.
E. United Kingdom. From Parliamentary Paper Cd. 4867. Imports.
F. United Kingdom. From Parliamentary Paper Cd. 4867. Exports.
G. United States. Wholesale Prices; 257 Commodities.
H. Canada. Wholesale Prices; 230 Commodities. Weighted.
I. Canada. Wholesale Prices; 230 Commodities. Unweighted.

TABLE II.—VARIOUS PRICE INDEXES, 1871-80. REDUCED TO 1871 AS BASIS.

Year.	M. 22 Com.	N. 45 Com.	O. 39 Com.	P. 22 Com.	Q. 114 Com.	R. 50 Com.	S 223 Com.	T. 223 Com.	U. 223 Com.	V. 223 Com.
1871 ..	100	100	100	100	100	100	100	100	100	100
1872 ..	109.5	107.2	109	106.6	106.8	105.4	102.1	97.9	97.3	103.5
1873 ..	113.8	112.3	111	106.1	108.9	110	101.1	96.1	94.8	99.3
1874 ..	111.6	108.9	102	97.4	107.2	104.5	97.8	96.6	95.5	97.1
1875 ..	107.3	103.4	96	98.2	102.2	99.1	93.8	96.0	94.7	92.1
1876 ..	104.7	101.5	95	96.2	101.0	92.7	86.9	92.6	90.1	95.3
1877 ..	104.8	104.1	94	98.2	100.5	93.6	81.5	87.7	83.5	84.9
1878 ..	98.6	97.5	87	85.4	94.9	87.3	74.5	82.6	76.9	81.3
1879 ..	85.9	93.1	83	83.1	92.2	83.6	71.0	77.4	69.8	—
1880 ..	99.5	95.3	88	85.0	96.0	87.3	78.6	82.9	77.1	—

M. The Economist (Old Basis); Wholesale Prices; 22 Commodities.
N. Board of Trade. Wholesale Prices in United Kingdom; 45 Commodities.
O. Sauerbeck. Average Prices in England; 39 Commodities.
P. Palgrave's French Prices; 22 Commodities.
Q. Soetbeer's Hamburg Prices; 114 Commodities.
R. Mulhall. "Ratio of Values"; 50 Commodities.
S. Aldrich Report; 223 Commodities—Commodities Unweighted.
T. ,, ,, ,, ,, Commodities Weighted according to Uniform Expenditure.
U. ,, ,, ,, ,, Commodities Weighted according to 68.6% of Total Expenditure.
V. ,, ,, ,, ,, Gold Index Numbers. All commodities averaged simply.

Reverting to Table I., it is obvious that weighting is not a matter of indifference even with a large number of commodities: see columns H and I, years 1900 and 1901, for example. Further, it is evident that the effect of ignoring weighting may be relatively large: see for example the year 1909 in the same columns, giving 119.4 for the weighted, and 112.0 for the unweighted results. It is clear from the same table (see columns A, B, C, D, for example, year 1904) that the indications of tables as now prepared are of relatively small value for deducing reliable estimates.

A comparison of the results on Table II. leads to the same conclusion, viz., that the divergences between different estimates of a price-index are so great as to indicate that at present they are of very limited value.

It will be appropriate to indicate the nature and defects of various methods of computing a price-index. In this connection it may be remarked that if I, J, K, etc., are price-indexes for any series of dates, then the scheme of computation should be such that the ratios I/J, I/K, J/K, shall remain unchanged in whatever order the results are obtained.

Some remarks are added later concerning a supposed demonstration that the geometric mean is unsatisfactory.

10. Various Methods adopted for measuring the Exchange-Value of Money.—The following are various methods which have been employed for determining the variations in the exchange-value of money. The essential features of each method are given in terms of the notation employed hereinbefore. The notation used is that of § 2, and the products αa, βb, etc., therefore measure the money-value-importance of the different commodities at times shewn by the suffix employed. They are denoted by ζ_0, η_0, etc., ζ_1, η_1, etc., according to the dates. See formulæ (13) and (13*a*).

(i.) **Dutot's Method.**—In this method the prices of commodities are taken at their market quotations, and the mass-units are assumed to be equal. Then if P_1 and P_0 are the price-indexes at dates 1 and 0,

$$(21) \quad \ldots\ldots \quad \frac{P_1}{P_0} = \frac{a_1 + b_1 + \text{etc.}}{a_0 + b_0 + \text{etc.}} = \frac{a_{0\cdot 0}p_1 + b_{0\cdot 0}q_1 + \text{etc.}}{a_0 + b_0 + \text{etc.}}$$

This method consequently weights the price-ratios with the numbers a_0, b_0, etc., viz., the prices at date 0. The method is probably now rarely used.

(ii.) **Carli's Method.**—This method consists simply in taking the arithmetic mean of the different price-ratios and is expressed algebraically as follows :—

$$(22) \ldots\ldots \quad \frac{P_1}{P_0} = \frac{1}{n}\left(\frac{a_1}{a_0}+\frac{b_1}{b_0}+\text{etc.}\right) = \frac{1}{n}\left({}_0p_1 + {}_0q_1 + \text{etc.}\right)$$

(iii.). **Evelyn's Variation of Carli's Method.**—In Evelyn's variation several periods are compared with the first, all the prices of which are taken as 100. Suppose that we have

$$\frac{P_1}{P_0} = \frac{1}{n}\left(\frac{a_1}{a_0}+\frac{b_1}{b_0}+\text{etc.}\right); \quad \frac{P_2}{P_0} = \frac{1}{n}\left(\frac{a_2}{a_0}+\frac{b_2}{b_0}+\text{etc.}\right);$$

then it follows that—

$$(23) \quad \frac{P_2}{P_1} = \frac{\frac{a_2}{a_0}+\frac{b_2}{b_0}+\text{etc.}}{\frac{a_1}{a_0}+\frac{b_1}{b_0}+\text{etc.}} = \frac{\frac{a_1}{a_0}\cdot\frac{a_2}{a_1}+\frac{b_1}{b_0}\cdot\frac{b_2}{b_1}+\text{etc.}}{\frac{a_1}{a_0}+\frac{b_1}{b_0}+\text{etc.}}$$

Consequently the expressions $\frac{a_2}{a_1}$, $\frac{b_2}{b_1}$ instead of being weighted evenly (the essential feature of Carli's method) are weighted according to the numbers a_1/a_0, b_1/b_0, etc., *i.e.*, according to the price-ratios between 1 and 0. This points to an inconsistency in Carli's method, which is repeated in Young's method, to which reference will now be made.

(iv.) **Young's Method.**—In this method prices at the first period are taken as unity, and at the second period as a'_1, b'_1, etc. These last values are weighted according to the relative total-exchange-values of the classes in general use (at some period), and the sum of the products divided by the sum of the weights. Algebraically it is expressed thus :—

$$(24) \ldots\ldots \quad \frac{P_1}{P_0} = \frac{\zeta a'_1 + \eta b'_1 + \text{etc.}}{\zeta + \eta + \text{etc.}}$$

a'_1 denoting the value of $\frac{a_1}{a_0}$ when a_0 is taken as unity.

Young's method, however, has the same inconsistency as Carli's, for

$$\frac{P_2}{P_0} = \frac{\zeta a'_2 + \eta b'_2 + \text{etc.}}{\zeta + \eta + \text{etc.}}; \text{ consequently}$$

$$(25) \ldots\ldots \quad \frac{P_2}{P_1} = \frac{\zeta a'_2 + \eta b'_2 + \text{etc.}}{\zeta a'_1 + \eta b'_1 + \text{etc.}} = \frac{\zeta a'_1 \cdot \frac{a_2}{a_1} + \eta b'_1 \cdot \frac{b_2}{b_1} + \text{etc.}}{\zeta a'_1 + \eta b'_1 + \text{etc.}}$$

In other words, the weighting is now $\zeta a'_1$, $\eta b'_1$, instead of ζ, η, etc.

(v.) **Scrope's Method.**—The essential feature of Scrope's method is that the same mass-units are employed at different periods. Algebraically it may be written as follows :—

$$(26) \ldots\ldots \quad \frac{P_1}{P_0} = \frac{\alpha a_1 + \beta b_1 + \text{etc.}}{\alpha a_0 + \beta b_0 + \text{etc.}}$$

that is to say, it is what has been called in § 2 herein, the "cost-of-living" formula (2). This is equivalent to the following :—

$$(26a) \ldots\ldots \quad \frac{P_1}{P_0} = \frac{\alpha a_0 \cdot \frac{a_1}{a_0} + \beta b_0 \cdot \frac{b_1}{b_0} + \text{etc.}}{\alpha a_0 + \beta b_0 + \text{etc.}}$$

This latter formula shews that the price-ratios are weighted by the multipliers αa_0, βb_0, etc., which would represent the original expenditures if α, β, etc., were the original quantities or mass-units, or the *average expenditures* if α, β, etc., are suitably taken. Thus it resembles Young's method in form. We shall shew later that it is really the best form.

(vi.) **Laspeyres' and Paasche's Variation of Scrope's Methods and Scrope's "Emended Variation."**—It may be remarked that the question of the exact mass-quantities to be used has not yet been touched. Three methods are possible:—

(*a*) By using the mass-quantities of the initial period—

$$(26b) \;\ldots\ldots\; \frac{P_1}{P_0} = \frac{\alpha_0 a_1 + \beta_0 b_1 + \text{etc.}}{\alpha_0 a_0 + \beta_0 b_0 + \text{etc.}} \quad \text{(Laspeyres' variation);}$$

(*b*) By using mass-quantities of the final period;

$$(26c) \;\ldots\ldots\; \frac{P_1}{P_0} = \frac{\alpha_1 a_1 + \beta_1 b_1 + \text{etc.}}{\alpha_1 a_0 + \beta_1 b_0 + \text{etc.}} \quad \text{(Paasche's variation);}$$

(*c*) By using some mean between the two. The best known is the geometric mean, viz.,

$$(26d) \;\ldots\ldots\; \frac{P_1}{P_0} = \frac{\sqrt{\alpha_0 \alpha_1}.a_1 + \sqrt{\beta_0 \beta_1}.b_1 + \text{etc.}}{\sqrt{\alpha_0 \alpha_1}.a_0 + \sqrt{\beta_0 \beta_1}.b_0 + \text{etc.}}\,,$$

which is known as Scrope's "*emended variation,*" see formulæ (13) (13*a*) and (14) hereinbefore, where it has already been shewn that the more convenient arithmetic mean of α_0 and α_1, etc., is sufficiently accurate.

(vii.) **Drobisch's Method.**—This method is the best known example of the methods depending on double-weighting. Drobisch took his prices to be prices of the same *aggregated mass-unit,* that is a unit consisting of all the commodities in the relative quantities as used. His method assumes that the average price of an aggregated mass-unit will be as follows, viz.:—

$$\frac{\alpha_0 a_0 + \beta_0 b_0 + \text{etc.}}{\alpha_0 + \beta_0 + \text{etc.}}\,, \text{ at the first period; and}$$

$$\frac{\alpha_1 a_1 + \beta_1 b_1 + \text{etc.}}{\alpha_1 + \beta_1 + \text{etc.}}\,, \text{ at the second period;}$$

and so on. From this we have directly

$$(27) \;\ldots\ldots\; \frac{P_1}{P_0} \quad \frac{\dfrac{\alpha_1 a_1 + \beta_1 b_1 + \text{etc.}}{\alpha_1 + \beta_1 + \text{etc.}}}{\dfrac{\alpha_0 a_0 + \beta_0 b_0 + \text{etc.}}{\alpha_0 + \beta_0 + \text{etc.}}}$$

This equation is equal to—

$$(27a) \;\ldots\ldots\; \frac{P_1}{P_0} \quad \frac{\alpha_1 a_1 + \beta_1 b_1 + \text{etc.}}{\alpha_0 a_0 + \beta_0 b_0 + \text{etc.}} \cdot \frac{\alpha_0 + \beta_0 + \text{etc.}}{\alpha_1 + \beta_1 + \text{etc.}}$$

It is obviously a fallacy to suppose that differently constituted "aggregated-mass-units" can be compared in this way: see remarks in the next sub-section.

(viii.) **Lehr's Method.**—Lehr's method, as Drobisch's, also employs double-weighting, but differs from Drobisch in the second factor on the right hand side of (27*a*). Algebraically it may be written—

$$(28) \;\ldots\ldots\; \frac{P_1}{P_0} = \frac{\alpha_1 a_1 + {}_1\beta b_1 + \text{etc.}}{\alpha_0 a_0 + \beta_0 b_0 + \text{etc.}} \cdot \frac{\alpha_0\left(\dfrac{\alpha_0 a_0 + \alpha_1 a_1}{\alpha_0 + \alpha_1}\right) + \beta_0\left(\dfrac{\beta_0 b_0 + \beta_1 b_1}{\beta_0 + \beta_1}\right) + \text{etc.}}{\alpha_1\left(\dfrac{\alpha_0 a_0 + \alpha_1 a_1}{\alpha_0 + \alpha_1}\right) + \beta_0\left(\dfrac{\beta_0 b_0 + \beta_1 b_1}{\beta_0 + \beta_1}\right) + \text{etc.}}$$

Lehr's method uses the arithmetic average, firstly with double-weighting, secondly on the mass-units that have the same average price over both the periods compared. It is also unsatisfactory, the objection to the methods of both Drobisch and Lehr being that were an equality of prices at two periods accompanied by a large difference (increase) in mass-quantities, it would lead to a difference (increase) in the price-index. That is to say, *though the price of every commodity might remain the same, the formulae both of Drobisch and Lehr would furnish different price-indexes.*

11. **Erroneously Alleged Defects in the Geometric Mean.**—Laspeyres (a professor in the University of Basle) urged that the geometric mean, suggested by Jevons, was defective, supporting his contention by the following argument:—He supposes that from date 0 to date 1 the price of commodity A advanced from 1 to 2,

and commodity B declined from 1 to $\frac{1}{2}$. Since to purchase a unit of each commodity, 2 money-units would have been required initially, and at the second date $2\frac{1}{2}$ money-units, he argues that the prices have advanced from 2 to $2\frac{1}{2}$, that is 25%. This, of course, is what is given by formula (2) herein, which *limits the consideration to the case where the mass units purchased are constantly the same.* In this case there can be no doubt as to which is the correct formula, in other words, the second aggregate of expenditure over the first aggregate is the only correct mode of computing the ratio of advance. But if, on the other hand, the general case is to be considered, where the degree of usage of each commodity may possibly have changed between the two periods, we cannot then assume that the mass-units are to be regarded as equal. The weights for price-ratios are *expenditures,* and in the case supposed by Laspeyres they are not equal. In this instance the "weights" at date 0 are the same for commodity A and B, but at date 2 the "weights" have materially changed. If we take the "weighting" into account, then the geometric mean of the weights will give results very approximate to those which Laspeyres claims should be given, and yet the case is not quite so limited as his was. The illustration confirms the view that in the general case, the geometric mean gives undoubtedly the better result, and Laspeyres' case does not really dispose of Jevons' argument : all it shows is that when price-ratios are used, proper weighting is no less important than in any other case, contrary to popular economic opinion. Thus by formula (2) we have the price-index 125 (Laspeyres' alleged correct value). But using geometric mean weights we get—

Commodity.	Date 0.	Date 1.	Price Ratio.	Weights.
A	1	2	${}_0p_1 = 2$	$u_0 = 1;\ u_1 = 2$
B	1	$\frac{1}{2}$	${}_0q_1 = \frac{1}{2}$	$v_0 = 1;\ v_1 = \frac{1}{2}$

Hence the result by the geometric mean, with geometric mean weights=125.99.

We see from this that Laspeyres' argument fails wholly, if as was originally pointed out, it is remembered that comparisons are invalid which take no account of those variations in the relative importance of commodities, which may be described as *changes in the standard of expenditure,* similar for example to changes in the standard of living or regimen. In other words, Laspeyres' contention that the geometric mean by Jevons' method gives *no change of price-index,* is merely a consequence of an inappropriate method of deducing a price-index, and confirms the view hereinbefore expressed, that exact "weights" must be used, if the deduced price-indexes are to have any economic value. Jevons' own suggestion, that perhaps the harmonic mean may be taken, is in general invalid, for reasons already indicated.

12. **The Aggregate-Expenditure Method, the Best.**—In § 10, Scrope's method, Laspeyres' and Paasche's variations of this method, and Scrope's own "emended variation" have already been referred to. Scrope used the same mass-units at different periods, *i.e.*, he assumed a *constant regimen.* Laspeyres' variation, also based upon a constant regimen, was that he used the mass-units of the initial period, while Paasche used those of the final period. A geometric mean between the two (even an arithmetic mean is sufficient) is perhaps more accurate. These four formulae are all summed up by formula (2), Laspeyres using as mass units α_o, β_o, etc.; Paasche α_m, β_m, etc.; the geometric and arithmetic means are $\sqrt{(\alpha_o\,\alpha_m)}$, etc., and $\frac{1}{2}(\beta_0 + \beta_m)$, etc. *They are satisfactory only for any two years to be compared,* but the fundamental idea for perfectly unequivocal comparison for a series of years is *the cost of a definite regimen for those years.* Hence with the aid of statistics we must make such attempt as is possible to define a regimen that may be regarded as applicable to each of the years which are to be included in a comparison.* That is, we assume mean values for α, β, γ, etc. Thus we use formula (2) or (26) with these mean values for the mass units..

We shall first shew the substantial identity of the only reasonably accurate price-ratio method, formula (11), with the aggregate-expenditure method, formula (2). Denoting the average values of the mass-units by α, β, etc., we may shew† that if J denote the result by (11) and I by (2), then

$$\log J = 2\left\{\frac{\alpha ax + \beta by + \ldots}{\alpha a + \beta b + \ldots} + \frac{1}{3}\left(\frac{\alpha ax^3 + \beta by^3 + \ldots}{\alpha a + \beta b + \ldots}\right) + \frac{1}{5}\left(\frac{\alpha ax^5 + \beta by^5 + \ldots}{\alpha a + \beta b + \ldots}\right) + \text{etc.}\right\}$$

$$\log I = 2\left\{\frac{\alpha ax + \beta by + \ldots}{\alpha a + \beta b + \ldots} + \frac{1}{3}\left(\frac{\alpha ax + \beta by + \ldots}{\alpha a + \beta b + \ldots}\right)^3 + \frac{1}{5}\left(\frac{\alpha ax + \beta by + \ldots}{\alpha a + \beta b + \ldots}\right)^5 + \text{etc.}\right\}$$

in which $\frac{a_1}{a_0} = \frac{1+x}{1-x}$; $\frac{b_1}{b_0} = \frac{1+y}{1-y}$; etc.

* The question of variation of regimen I have considered elsewhere, but not herein.

† This has been done elsewhere.

In all ordinary cases x, y, etc., are small quantities. If we suppose them equal, the two expressions are identical. If they range in value from 1 to 10, and ξ be their mean value, then the difference $\log J - \log I = -\frac{3}{4}\frac{n-1}{n+1}\xi^3$ where n is the number of commodities.

If we also suppose the average expenditures on the commodities to range from 1 to 10, then $\log J - \log I =$ about $0.56\ \xi^3$ when $n = 100$, and is never large. Remembering that in practical examples ξ can never be say $\frac{1}{5}$, in which case ξ^3 is $\frac{1}{125}$, it is easy to see that the two expressions are sensibly identical for any large number of commodities.

Since the price-index found from price-ratios, using the properly weighted geometric mean, is sensibly identical with the price-index found from the aggregate of expenditures, *it is evident that results by unweighted means of price-ratios should be rejected*, and further that the weights of price-ratios are very important.

The advantages of the method of aggregate expenditures, formula (2), may be stated as follows :—

(i.) It is incomparably superior to the unweighted price-ratio method if the mass-units are at all near the true usage-quantities.

(ii.) If the mass-units are only approximately correct, small differences in their value will not sensibly vary the result.

(iii.) One can instantly see in practical computation the influence of each term on the result, and thus estimate the effect of any uncertainties.

(iv.) It is the simplest possible of all methods, the precision of which entitles them to consideration.

Finally in this connection it may be said that, reverting to formula (26a) in § 10, the "weights" or expenditures αa_0, βb_0, can be made an average (or a *probable* average if we must estimate the future) and dividing these averages by a_0, b_0, we get *mass-units*, which must on the whole be satisfactory, and further by assuming even an approximately true regimen, far more exact results will be obtained than are furnished by an imperfectly weighted price-ratio combination.

13. **Conclusion.**—The conclusion of the whole matter may be stated as follows :—

(i.) The only accurate comparison that can be made between the purchasing power of gold at any two dates is one made on the basis of a definite series of commodities. The differences between different price-indexes shew that even an extensive series of commodities does not give a definite *general result*.

(ii.) For international purposes it is desirable that a *standard-series of commodities* should be adopted, and that this standard series should be used as a basis for all international comparisons.

(iii.) That in connection with this series a definite method as to obtaining prices should be adopted so that the results in one country will be immediately comparable with the results obtained in any other.

(iv.) The prices of individual elements in this standard series should be *weighted according to the mean usage of the whole of the countries included.*

(v.) The weighted aggregate-price expressed in terms of some gold-unit (say £1) should be furnished, and the comparisons based upon the ratio of the weighted aggregate prices, that is, according to formula (2) herein. Such a comparison is perfectly accurate and definite, and there is no mathematical objection to the mode of computing it.

(vi.) In all cases where price-ratios are used, each commodity in the tabular lists should have associated with it the weight-number used in the computation of the price-index, and these numbers should be in the ratios of the expenditures on the commodities. In comparing the price-index of one period with another these changes of weights should be taken strictly into account.

(vii.) Where the weights between the two periods differ but slightly, no appreciable error will arise by taking their arithmetic instead of the geometric means.

(viii.) Where the weights are very different, the geometric mean should be employed. The general aggregate should be computed on the principle of the geometric mean, *i.e.*, the logarithms should be taken out of the price-ratios, multiplied by the mean-weight; the sum of these products, divided by the sum of the weights will be the logarithm of the result required.

(ix.) Comparisons of this character assume that the usage of the aggregate of the commodities is everywhere the mean adopted, and are, therefore, on this assumption very accurate, so far as the mere computation method itself is concerned.

(x.) It is easily seen that, for simplicity, the price-ratio method cannot compare with the aggregate expenditure method.

(xi.) A result obtained on the lines suggested can be regarded, however, only as an individual ground of comparison, viz., one of a purely international character, and its intrinsic value will depend upon the extent to which the whole series of commodities and assigned weights may be regarded as internationally significant.

(xii.) Even such a basis as this will, in the lapse of time, doubtless be subject to a progressive movement, and it may become necessary to alter periodically the list of commodities as well as to vary the weights assigned to each.

(xiii.) To the extent this alteration takes place the new price-indexes will not be directly comparable with the old, and a special investigation would be required to connect the two.

(xiv.) The international basis, moreover, will, in general, not be the best possible or most appropriate for the individual nations in the group.

(xv.) For national purposes it would not be difficult, however, to include other necessary items.

(xvi.) For practical convenience it is eminently desirable that the international group-result should be kept intact.

(xvii.) The suitable variations of weighting and inclusion of other commodities for national purposes can easily be managed through repetition of commodities with positive or negative weights, and the inclusion of other commodities with appropriate weights.

(xviii.) The same remarks apply *mutatis mutandis* in regard to the preparations of price-indexes for particular classes in a community, for it will be readily recognised that the purchasing-efficiency of money varies from class to class, and the idea that there is a general value can be regarded as correct only in so far as it may be conceived to apply to "an average individual" (*l'homme moyen* of Quetelet).

(xix.) The international comparison-basis would furnish the norm with which the price-index of each nation could be compared, and both it and the national price-index would furnish norms with which the results for different classes within the community could be compared.

(xx.) In view of the value of a properly computed price-index, the mere trouble of taking out logarithms of prices is a negligible quantity, and even this is unnecessary for the formation of price-indexes on an international basis.

(xxi.) Finally we may say that the aggregate of expenditures on a definite regimen is the only satisfactory method that is at all convenient from the standpoint of computation.

APPENDIX IX.

ON THE ESTABLISHMENT OF A BASIS FOR INTERNATIONAL COMPARISONS OF THE EXCHANGE-VALUE OF GOLD, AND VARIATIONS IN THE COST OF LIVING.

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SYNOPSIS.

1. **Introduction.**—The financial and general relations of one nation with another are now seen to be so intimately connected, that all changes in human affairs must be discussed in their broadest aspects on an international basis. To do this effectually it is necessary that for all matters, subject to statistical analysis, *mean-values* should be established which, in virtue of their nature, may constitute *norms* for all comparisons, and for extensive generalisations. The standard of living, the habits, tendencies, and general character, the degree of civilisation, and the financial methods of the whole of the western civilised world, though divergent in details, tend more and more to closely approximate to each other, so as to constitute the world *in some special sense an economic unity*. For this reason *economic norms* occupy an important position among those which should be established. These will represent not merely the experience and characteristics of a particular nation, but of the whole aggregate of nations of which it is but an individual member; and which constitute the international solidarity, and among the economic norms, a series of numbers (price-indexes) which shall reveal the variations of the exchange value of the basis of the monetary system (gold), necessarily takes the place of highest importance. Reflexions upon the whole matter disclose the fact that we have arrived at that stage of world-development when it has become necessary to enlarge Quetelet's idea of the "average man" (l'homme moyen) to include the idea of a representative man of large groups of nations; indeed we must also create the idea of the "*average nation*" (la nation moyenne). This "average nation," its constitution and general

characteristics, will represent the entire western world and will constitute the proper norm for the study of the deviations of individual nations or lesser communities forming the combined group. It is evidently of the highest value for all comparative studies of national characteristics.

It will often be essential, or at least desirable, to compare smaller communities, within the nation to which they belong, not only with the international norms (the characteristics of the average nation), but also with the characteristics of the nation of which they form a part. By these two processes we may arrive at the highest form of generalised statistical knowledge.

What has been stated above may be regarded as the fundamental principle to be applied in the statistical methods of the western world as it is now constituted. It alone recognises the essential solidarity of that world, and that the significance of national variations from the international average, can be duly appreciated only by comparision with such average.

In this connection it may be observed that one of the most far-reaching elements among the relations of nations is that which touches the phenomena of the *fluctuations in the exchange-values of commodities*. The most general expression for this is in terms of money, viz., *price*, since money, being the medium of exchange for all commodities, has in consequence become the common measure of their value. Thus price, expressing inversely the exchange-value of the medium of exchange (gold) against any commodity, enables the exchange-relation between all commodities to be immediately deduced.*

It is convenient sometimes to follow, for certain purposes, the fluctuation in its exchange-value of the gold-unit rather than to follow the course of prices. In other cases, however, prices serve most readily for such comparisons as are required. Again, we may combine commodities to form a group and fix our attention on the *varying quantities of gold necessary to purchase such given group*. This idea we shall see is of the highest practical importance.

For all *international comparisons* of exchange-value it is self-evident that there must be a *common basis* in respect of the commodities selected to measure the variations of that value. Unless the basis be identical for each country, the results must necessarily be dubious; that is to say, it will become impossible to clearly distinguish between the extent to which differences in the exchange-value of gold are due to differences in the aggregate of commodities, or are due to other phenomena affecting the exchange-value, for example variations in the quantity of gold available for currency purposes, changes in the velocity of the movement of currency, or such changes as extensions or contractions of credit, etc., all of which are variations in the effective supply of the medium of exchange.

The common basis referred to, in order to be of real value, must be sufficiently extended and so weighted as regards its individual elements, as to represent the *usage of the aggregate of the nations* grouped, or what is the same thing, the usage of the "*average nation.*" It is further necessary that this *one basis should be maintained for the whole period* which a particular scheme of unequivocal comparisons is designed to include.

Here, however, a difficulty arises. It is no less obvious that to maintain the reality of the comparison, the basis must change if the usage of mankind changes. A perpetually fixed basis would not represent "the usage of the average nation." It may, therefore, be admitted that any satisfactory basis will exhibit a slow progressive change in regard to the elements of which it is constituted, and the weights that must be assigned to those elements. The character of this secular variation and the question as to how the exchange-value of gold is to be estimated when the usage of the average nation has changed, must be specially investigated. To this we shall refer later, though it will form no part of the first question for our consideration. It may, however, be noted that since changes in the usage of the "average nation" will necessarily vary but slowly, and probably cannot be predicted with any

* For so long as the unintelligence and bad-will of mankind necessitates so wasteful a procedure, the commodity *gold* (and silver) may be regarded as in some way the *real* basis of the idea of money, and this notwithstanding the fact that the use of the precious metals will probably be greatly limited or may even cease when international obligations are certain to be honoured, or when an international credit system is sufficiently assured: a consummation which doubtless will tend to be reached in proportion as the jeopardy of war is diminished. So long as we bear in mind that we are thinking of *money* in general, rather than *actual gold*, we may use the expression "purchasing-efficiency or exchange-value of gold" to represent that reciprocal of the relation between the commodity gold and any other commodity, which is expressed as *price*. In this view "price" is looked upon as defining the instantaneous potentiality of exchange, by the artifice of a *supposed real commodity*, viz., gold.

exactitude, results must ordinarily be elaborated on a basis lasting for a given period (say a decennium), that is, on a basis which will always be a little out of date. This, however, is unavoidable, and may readily be seen to constitute no serious difficulty.

The whole question thus resolves itself into the following, viz. :—

(i.) The formulation of a sufficiently extensive *list of commodities* in common usage among the different nations included in the international group ;

(ii.) The determination of the *relative importance of these commodities* either directly, or by an appropriate combination of the results for each nation, so as to ascertain the " average " importance for the whole group ;

(iii.) The *technique* by means of which the general result is ascertained.

It would seem that the simplest way of determining the relative importance or " weight ", therefore, from an economic point of view, depends upon two elements, viz., the aggregate-usage and the price. Thus, for example, if we divide the price of a commodity for any year by the price for some other year arbitrarily selected as a datum year, the quotient may be called the *price-ratio* of those years in respect of the commodity in question. Now this may be regarded as *one* of many possible measures (viz., through any other commodity) of the variation of the exchange-value of the money-unit (gold). It is immediately obvious that the relative importance of a series of these measures would depend upon the relative expenditure on each commodity. Hence in attempting to deduce a general estimate from a series of price-ratios, we should, in order to ascertain the weight which is to be assigned to each commodity, first have to ascertain the aggregate expenditure for the whole of the group of nations concerned, or else the average price of each commodity, and the aggregate number of units used of each commodity.

If, on the other hand, we intended to base our conclusions as to variations of exchange-value on a *definite average regimen* of so many units of each commodity, then we should need either to ascertain the number of units of each commodity in the regimen from direct statistics, or we should have to divide the international aggregates of expenditure by the international averages of price, to find the number of units. As already indicated, which course it is desirable should be followed, will depend upon whether the variation in the exchange-value of gold is to be evaluated from the aggregate cost of a particular regimen (*i.e.*, of so many units of a definite series of commodities) or is to be deduced as some " weighted " mean of a series of price-ratios.

As regards the question of relative weights, it may be remarked that there is obviously no *intrinsic* relation between units, as say between a gross, of one commodity, a ton of a second, and a gallon of a third, and it is therefore evident that the only common measure of the importance is the money or exchange-value of the aggregate use of the commodity. This, however, is unfortunately variable, the variations of price themselves producing changes of " weight." The difficulties, however, are not insuperable, for in general the " means " for a large aggregate vary relatively slowly. We may assume therefore that it is practicable not only to establish a list of commodities, but also to assign to the price-ratios of each a " weight "-number, expressing its importance in the entire group. It may be further noted that this series of " weight "-numbers must apply to limited periods (*e.g.*, for a decennium), and may then be revised ; and it is of course possible also that the *list of commodities* must also be periodically revised. We can also decide on the average number of units of each used, that is, the quantities of each commodity in the average regimen.

When a list of commodities and the relative number of units of each used, or appropriate " weight " numbers are to hand, it is necessary then to decide upon a suitable arithmetical technique of comparison. The only unequivocal or *perfect* system of obtaining comparable results is to compute the aggregate-value of the whole series, from the number of units of each commodity corresponding to average usage, and the average price for the particular period (day, month, quarter or year, for example) which it is desired to compare ; see formula (3) in § 3, hereinafter. Since the arithmetical labour involved is by no means prohibitive, it may also be very desirable to watch the characteristics of monthly or quarterly fluctuations in these aggregates, for example, in order to study the variations of exchange-value of gold within the year itself, and the mean of the results of any smaller period would furnish the requisite mean value for a longer one. For example, the mean of the four quarterly results would give the mean value for a year.

These aggregate values deduced from the whole series of commodities from the prices of each, and using the proper number of units of each, enable all necessary comparisons to be made with mathematical strictness. We may define this as the "method of aggregate expenditures." This method is unquestionably better than that of using price-ratios with weights. Any year may be made a datum, and references may be made forward or backward from that year without in any way vitiating the comparison; in other words, the process in this instance is always *arithmetically consistent*. Expressed as an algebraic formula, the process is as shewn hereinafter in § 3, see (3).

A method already referred to which has been largely used and which, if properly handled, is also fairly, but never wholly, satisfactory, is to deduce the price-index from price-ratios with appropriate weights. The average price of each commodity for some year is taken as a datum, and the price-ratios are ascertained by dividing the price for any other period by the price for the datum period. The quotient, usually multiplied by 100, is the price-ratio of the latter date compared with former. When price-ratios are used, it may be shewn that the only proper mode of combination is what is known as the geometric, and this method is the only one used which is arithmetically consistent. To obtain the geometric mean each price-ratio is raised to the power indicated by the "weight," and the product of the whole of the price-ratios, so raised, is a radicand of which a root, equal to the sum of all the weights, is to be taken. The indicated operation is very simply effected by taking out the logarithms of the price-ratios, multiplying each by its corresponding weight, and dividing the sum of these products by the sum of the weights.

Expressed as an algebraic formula, this last prescription is denoted by :—

$$(1) \;\ldots\ldots\; I = \left(p^{u} . \; q^{v} . \; r^{w} . \text{ etc.} \right)^{\frac{1}{u + v + w + \text{etc.}}}$$

or logarithmically—

$$(2) \;\ldots\ldots\; \log I = \frac{u \log p. + v \log q + w \log r + \text{etc.}}{u + v + w + \text{etc.}}$$

in which p, q, r, etc., denote the price-ratios of a series of commodities, u, v, w, etc., their "weights," based upon expenditures, and I the price-index required.

This process gives values very similar to the previous one, and is *arithmetically consistent*. Attempts have been made to obtain price-indexes by multiplying each price-ratio by the corresponding "weight" and dividing by the sum of the weights. Such a process, however, is arithmetically invalid, since it gives incorrect ratios between different years. In other words, it furnishes different results according as to whether we work from the calculated general result or from the original data. This is sufficient ground for excluding the method. We shall shew later on the nature of the arithmetical inconsistencies referred to, and it may here be stated that the extraordinary differences in the exchange-value of gold, indicated in the different series furnished by economists, shew that some better arrangement must be made if the price-indexes or index-numbers are to have any general validity, or are to be used critically. The most fruitful source of these differences lies in the fact that the lists of commodities are not identical, and are subject to different weightings.

On the Selection of a List of Commodities.—It is evident that, in order to be comparable at any two periods, a commodity must not have materially changed in character or quality. Certain commodities, for example, may give less trouble in this respect than others; for example, such raw products as may be regarded as sensibly uniform in quality, or manufactured products that do not materially change in quality. Metallic ingots, pig iron, etc., may be taken as a fair illustration of the former, sugar, flour, etc., of the latter. But even in regard to these, either differences of quality or arbitrary preferences may cause the exchange-values to range between very wide limits.

It is well to point out here that variations of exchange-value may by no means be wholly attributable to a general variation in the purchasing-efficiency of gold. For example, articles in which the cost of manufacture enormously varies* will tend to reflect conspicuously every variation in the rate of the remuneration of labour. The obvious reason of this is, that with raw materials the proportion which labour represents is usually very small as compared with what it represents in very highly elaborated products.†

* Contrast such forms of *steel* manufacture as heavy springs for railway fittings, with watch-springs; or contrast say the production of heavy and chiffon *silks*. † For example with such commodities as watch-springs, in which the value of the raw material is wholly negligible, the resulting price depends practically wholly upon the cost of labour directly or indirectly.

It is self-evident that, with such commodities, the governing element is the rate of remuneration for labour, and that the price of the commodity tends merely to reflect the variations of this element.

As a consequence of the operation of influences of this kind, it would seem that in an international inquiry, either as to wholesale or retail prices, all commodities in common usage, and of which the quality is comparable and identifiable, might probably be included, but whether this be so or not will depend upon the fundamental purpose of the inquiry.

If, however, we were compiling a world-wide index-number, representing variations in the exchange-value of gold, it might probably be desirable not to include all commodities the qualities and characters of which are comparable and indentifiable, but merely those for which, in addition, world-markets exist. Thus it might be desirable to *exclude* all such vegetables, fruits, etc., the price of which would necessarily be governed mainly by *local* conditions. In a pure "cost-of-living" comparison such commodities and their prices could *not* of course be excluded.

We have seen that *variations in exchange-value are not wholly attributable to variation in the purchasing-efficiency of gold against ordinary commodities*, excluding labour, and further, that the object of the measure of the exchange-value varies according to the characteristics in the group of commodities by means of which it is measured.

It is clear from the considerations just indicated that the series of commodities should not only be individually identifiable in respect of character and quality, but should also be well selected from such point of view as is important, otherwise the derived results will be dubious, and it is here that the principal difficulty arises, though there is no escape from it.

It must be observed at the same time, however, that progress in the technique of industry indicates that we can push this principle too far, a good illustration of which would be the state of steel manufacture before and after the introduction of the Bessemer and the Siemens-Martens processes. Other examples that might be cited are sugar, chemical products, etc., in which there have been striking advances in quality. The advances in technology have led in many cases to marked improvement in the quality of the manufactured articles. Since, however, the use of the article, thus improved in quality, may be continuous, and the change in quality may proceed by imperceptible changes, a feature not uncommon with regard to textiles, for example, it is not always possible to take so exact an account of differences of quality as has been indicated as necessary.

Neglect of facts of this kind may easily betray one into an *undue faith in price-ratios*, and into the false belief that price-ratios for aggregates are *unequivocally* valid measures of the variations in exchange-value of gold, whereas the truth of the matter is that *changes in the exchange-value* of gold have been confused in the general result with variations in the *quality* of the articles, and consequential changes in their cost, utility, or esteem values.

What has been said is sufficient indication that in the selection of a series of commodities for the international basis, extreme care will have to be exercised. I have suggested a series, and have indicated their weight numbers at the end of this Appendix. This is done merely tentatively and purely by way of suggestion. It is supposed that each item in this series is identifiable with sufficient certainty to make the aggregate cost of the whole series reliable. It cannot be too distinctly borne in mind that the difficulty is not in any way got over by the use of price-ratios, as is sometimes supposed, *but is only hidden so as to be less readily discerned.*

The question of the significance of labour in the cost of commodities already referred to is worthy of special attention. We proceed to consider the matter.

The fact that commodities differ greatly in respect of the value of the raw material of which they are composed, and the amount of labour which has to be applied to that material in order to give them their final form, suggests that regard should be had thereto in the scheme of classification.*

As between one commodity and another the ratio of the two varies greatly, and *price* will tend to reflect all variations in the remuneration of labour in proportion as the labour element in the production of the commodity is large.

* To revert to a former illustration, the value of a watch-spring may be said to be due wholly to the cost of labour required to produce it, and it stands, therefore, in a very different economic position to, say a large and simple casting, the raw material being pig-iron, because for the production of the latter the element of cost of labour enters relatively to a much less extent. And even if in the last analysis it could be assumed that the original raw material is without value until labour is expended thereon, which is not always true, the fact still remains that we shall do well in any classification to have regard to the value of labour in production, as compared with the value of the raw material

From this it can be seen that it matters much whether the aim of an inquiry be to ascertain the efficiency of gold in respect to commodities *as influenced by wages, or as not influenced by wages*, and it is from this point of view that it may at once be seen how desirable it is that the list of commodities should be so divided as to furnish series shewing progressive amounts of labour applied to their production. In this way it will become possible to detect the influence upon price of ruling rates of wages. If, therefore, a whole series of commodities be divided into several classes, each class shewing progressively larger amounts of labour, then we shall have the material for discriminating between the purchasing efficiency of gold in regard to raw material and highly elaborated materials, and will have the data to ascertain how far demands for higher wages are merely equating themselves by a rise in prices. For if it were possible for the prices of commodities to rise throughout in the same ratio as wages, then there would be no advantage, the change would be merely a *nominal* one. It is from this point of view that one sees that, in so far as change of remuneration for labour results in increased prices, the advantage tends to become *unreal*, and is nullified the money which is paid for labour giving to its recipient no advantage in purchasing the commodities which satisfy his needs.

It is evident that this matter is of eminent economic importance. If in making, finally, the comparison of the price-indexes of the successive series of commodities in which the element of labour is playing a more and more conspicuous part and in which consequently the influence of the remuneration of labour is more and more felt it turns out that the latter tends to closely correspond to variations in the rate of wages, then the obvious economic deduction is that the result is due to variations in the remuneration of labour. Should the variations completely correspond with change in the cost-of-living for the class represented, the effect of rise in wages will be completely nullified by the rise in the price of the commodities used.

It will be seen from these considerations that the *divisions* of the list of commodities should, as far as possible, be *homogeneous* with respect to the relative cost of raw material to labour in the production of the commodity. We may conclude, therefore, that so far as the selection of commodities is concerned, the following principles may serve as a guide, viz. :—

(i.) The commodities should be identifiable in respect of their essential characters.
(ii.) They should be largely used.
(iii.) The whole series should be divided roughly into groups, homogenoous with respect to the relative value of raw material, and labour applied to convert each commodity into its final form.
(iv.) Only commodities which find a world-market should be used for international comparisons, for variations in the exchange value of gold.
(v.) A supplementary list of commodities of local production are necessary if it be desired to determine such variations in the cost of living as may be attributable to variations in the exchange value of gold.

3. **On the Determination of the Units and Weights of the Commodities.**—The unit by means of which different commodities are usually measured, may be volume or weight, or number of articles, etc. ; for example, in English measure, a gallon or a bushel, a pound or a ton, a gross or dozen, etc. All such quantities or units may be called *mass-units*, and the number taken for each commodity should be in the ratio of their actual usage. It is instantly evident, however, that there is no intrinsic relationship between economic value and the mass-units of different commodities ; for example, between a carat, in the measurement of the precious stones, and a gallon in the measurement of spirits ; in fact it is readily perceived that in the nature of the case there can be only one common measure for the relative economic importance of different commodities in question of variation of exchange-value, and that is *the product of the money-value of a unit, and the number of units used*, or upon the *relative aggregate expenditure* on the commodity. As previously indicated, when we suppose the number of units used to be constant at any two dates for which a comparison is desired, the best—in fact the only exact—comparison is the ratio of aggregate expenditure at the compared date to the aggregate expenditure at the original date. If the number of units of each commodity were not constant, then any deduced price-index would be vitiated by what may be called *change of regimen*. For this reason, once we decide upon the size of the unit which is to be compared, the mass-weight-number of units of usage may be determined by dividing the total expenditure by the price, and it is to be assumed that this number of units is constantly used throughout the periods compared.

There is, however, a much simpler way of stating the whole matter, viz., the following :—

It is obvious that when we use price-ratios the actual size of the unit used disappears. For example, price per ton divided by price per ton is the same thing as price per pound divided by price per pound. This has led to an erroneous opinion that price-ratios get rid of the necessity for considering the size of the unit, and that the weights assigned to the price-ratios in any computation represent the relative importance of the commodities. The relative importance, however, is measured by the aggregate expenditure since the money-unit is the only common measure of economic value or exchange-value. If, therefore, relative aggregate expenditure on any commodity (*i.e.*, the proportion of the expenditure on the commodity in question to the aggregate expenditure on all commodities) be equal on any two occasions, the combining "weight" of the commodity remains unchanged, in the computation of price-indexes from price-ratios.

From this point of view it becomes apparent that it is possible to compute a general variation in the exchange-value of gold with fair accuracy, *although the regimen on successive occasions* may have changed. Without doubt this fact has also given rise to the *erroneous* impression that price-ratios are to be preferred, and that they escape the difficulty about a *constant regimen*. It may be pointed out, however, that the basis of comparison should undoubtedly be the mean-weight between the two occasions, but to take this into account the arithmetical work of comparison is greatly elaborated and tends to become prohibitive. We shall return to this point later. It will suffice here to observe that a very much more convenient system could be adopted, by using units of quantity which can be regarded as representing the average use of all the nations in the international comparison.

If for the aggregate of nations a list, shewing the total expenditure upon the various items of a whole series of commodities during any definite period of time existed, this would represent the usage, and furnish the required number of units, or the mass-weights, the supposition being that that usage expressed the habit or the necessity of the people. It would indicate the economic weight that should be attributed to the individual item, by the ratio which expenditure on that item bore to the aggregate of all expenditures on the list. Futher, if, as is desirable, it were preferred to use numbers of "mass-units" of each commodity so as to form aggregates by summing the prices multiplied by these units to form totals for the dates to be compared (the ratio giving the price-index) then all that is necessary is to divide the international aggregates of expenditures by the international average prices. The quotients are the units required.

It may here be observed that questions of exchange-value are very properly dissociated from those of *utility-value, esteem-value*, and *cost-value* or other special measures of value, for many commodities obviously have esteem-values wholly out of relation to their cost-values; in fact, business-practice endeavours to create esteem-values so markedly above cost-values as to ensure large profits to the manufacturer or supplier. In the questions with which we are dealing, however, exchange-value is the only value that need be considered.

4. **Price-Indexes Deduced from Aggregate-Expenditures.**—It has already been said that much of the technique in connection with the determination of variations in exchange-value practically involves the clouding of the real issue in generalities; that *the comparison is unreal or dubious to the extent that the regimen has changed*, and that the preference for price-ratios merely arises from the fact that the defect in the technique of computing price-indexes from them has been relegated to a position where it is not discernible. In order to bring the matter into clear relief, let us take a very elementary case where only two commodities are under consideration, and observe exactly what takes place in different methods of combination. We shall denote the basic date by the suffix 0 attached to any quantity, and the second or later date by the suffix 1, the two commodities being denoted by A and B. We shall suppose the usage of these commodities at the two dates to be as expressed in the following schedule :—

Commodity.	Date 0.			Date 1.		
	Units.		Price.	Units.		Price.
A	1	@	3	1	@	6
B	2	@	4	3	@	5

and let us use first the method of the ratio of aggregate expenditures which, expressed algebraically, is—

$$(3)\ldots\ldots\ldots\ldots\ldots\quad I = \frac{\alpha a_1 + \beta b_1 + \gamma c_1 + \text{etc.}}{\alpha a_0 + \beta b_0 + \gamma c_0 + \text{etc.}}$$

in which α, β, γ, etc., are the number of units of each commodity used at each date, and a, b, c, are the prices of those units, the suffixes denoting the dates. We observe first of all that in the case considered there have been *changes in both regimen and price*, but to determine the variation in the exchange-value of gold we must eliminate the effect of change of regimen. Let us then first consider a comparison based upon a supposed *constancy of regimen*. Thus we may take into account three cases, viz., where the regimen at the second date is as at the first; where the regimen at the first date is as at the second; and where the regimen is the arithmetic mean of the regimens at the two dates. This will give us the result shewn hereunder as the effect of change of price, viz.:—

(i) the regimen consists of one unit of the first commodity, and two units of the second commodity on both dates;

(ii.) the regimen consists of one unit of the first commodity, and of three of the second on both dates; and

(iii.) the regimen consists of one unit of the first commodity, and two-and-a-half of the second commodity.

We thus get the following results:—

Regimen of date 0; (i.);
$$\frac{1 \times 6 + 2 \times 5}{1 \times 3 + 2 \times 4} = \frac{16}{11} = 1.4545$$

Regimen of date 1; (ii.);
$$\frac{1 \times 6 + 3 \times 5}{1 \times 3 + 3 \times 4} = \frac{21}{15} = 1.4000$$

Regimen an arithmetic mean of that at each date; (iii.);
$$\frac{1 \times 6 + 2\frac{1}{2} \times 5}{1 \times 3 + 2\frac{1}{2} \times 4} = \frac{18\frac{1}{2}}{13} = 1.4230$$

5. **Price-Indexes from Price-Ratios.**—Suppose now that we attempt to calculate such results by means of price-ratios. We have the following price-ratios for the two dates, (1)/(0), p denoting price-ratio for commodity A, and q denoting price-ratio of commodity B.

Commodity A.	Price Ratio.	Commodity B.	Price Ratio.
p =	$\frac{6}{3} = 2.$	q =	$\frac{5}{4} = 1.25.$

At the first date the aggregate expenditure was 11, of which 3 was on A and 8 on B, therefore the relative importance for A was $\frac{3}{11}$ and for B $\frac{8}{11}$. At the second date the aggregate expenditure was 21, of which 6 was for A and 15 on B, therefore the relative importance on the second occasion was $\frac{6}{21}$ or $\frac{2}{7}$ for A, and $\frac{5}{7}$ for B. Hence the arithmetic mean of the weights was—

$$\text{For A, } \frac{1}{2}\left(\frac{3}{11} + \frac{2}{7}\right) = \frac{43}{154} = u, \text{ say;}$$

$$\text{For B, } \frac{1}{2}\left(\frac{8}{11} + \frac{5}{7}\right) = \frac{111}{154} = v, \text{ say.}$$

Hence, working by the geometric means, we have—

$$log.\left\{(p^u q^v)^{\frac{1}{u+v}}\right\} = \frac{\frac{43}{154}\ log.\ 2 + \frac{111}{154}\ log.\ 1.25}{\frac{43}{154} + \frac{111}{154}} = \frac{23.7013}{154} = 0.153904.$$
$$= log.\ \text{of } 1.4253.$$

Now this last result is sensibly identical with what we found by taking the aggregate, and is nearly the mean of the results by suppositions (i.) and (ii.), viz., 1.4272. (If we take the *geometric mean of the weights* instead of the arithmetic mean we get:—

$$\text{For A, } \sqrt{\left(\frac{3}{11} \cdot \frac{2}{7}\right)} = 0.27914;$$

$$\text{For B, } \sqrt{\left(\frac{8}{11} \cdot \frac{5}{7}\right)} = 0.72075.$$

the sum of which is 0.99989, and this gives 0.1538963 the logarithm of 1.4253 as before.)

Two things are obvious from the example furnished for the case of two commodities, viz. :—

(*a*) That with a large number of commodities the mean number of units used of each may be taken as a basis for computation of a price-index from the ratio of aggregate expenditures at any two dates, (formula 3); and also

(*b*) that price-ratios weighted in proportion to the average expenditure will yield an almost *identical* result.

This may be shewn formally by finding an algebraic expression for the difference (D)—

$$(4)\ldots D = \left(p^{u} \cdot q^{v} \cdot r^{w} \cdot \text{etc.}\right)^{\frac{1}{u+v+w+\text{etc.}}} - \frac{\alpha a_1 + \beta b_1 + \gamma c_1 + \text{etc.}}{\alpha a_0 + \beta b_0 + \gamma c_0 + \text{etc.}} = H - K, \text{ say.}$$

in which $u = \frac{1}{2}\,\alpha\,(a_0 + a_1)$; $v = \frac{1}{2}\,\beta(b_0 + b_1)$; and $w = \frac{1}{2}\,\gamma(c_0 + c_1)$.

6. **Proof that the Method of Price-Ratios, with Weighting according to Average Expenditure, is Practically Identical with that of Aggregate-Expenditures.**—Since the method of determining price-indexes from price-ratios is commonly supposed to possess some advantages through its apparent generality, and since also such opinion is not sound, it is not unimportant to shew conclusively that it yields sensibly identical results in all practical cases. This may be shewn formally by finding an algebraic expression for the difference (D) above.

We may put a for $\frac{1}{2}\,(a_0 + a_1)$; b for $\frac{1}{2}\,(b_0 + b_1)$; etc.; and also $a_0 = a\,(1-x)$; $a_1 = a\,(1 + x)$; and similarly throughout.

Then we have

$$\frac{a_1}{a}\Big/\frac{a_0}{a} = \frac{a_1}{a_0} = \frac{1+x}{1-x}; \qquad \frac{b_1}{b_0} = \frac{1+y}{1-y}.$$

In all practical instances p, q, r, etc., do not differ greatly from unity, hence the quantities $f\,(1 \pm x)$, etc., can be expanded in convergent series. Thus we have to find the value of—

$$(4a)\ldots D\left\{\left(\frac{1+x}{1-x}\right)^{\alpha a} \cdot \left(\frac{1+y}{1-y}\right)^{\beta b} \cdot \text{etc.}\right\}^{\frac{1}{\alpha a+\beta b+\text{etc.}}} \quad \frac{\alpha a(1+x)+\beta b\,(1+y)+\text{etc.}}{\alpha a(1-x)+\beta b\,(1-y)+\text{etc.}} = H - K, \text{ say.}$$

The values of $\log H$ and $\log K$ are :—

$$(5)\ldots\ldots \log H = 2\left\{\frac{\alpha ax+\beta by+\ldots}{\alpha a+\beta b+\ldots} + \frac{1}{3}\left(\frac{\alpha ax^3+\beta by^3+\ldots}{\alpha a+\beta b+\ldots}\right) + \frac{1}{5}\left(\frac{\alpha ax^5+\beta by^5+\ldots}{\alpha a+\beta b+\ldots}\right) + \text{etc.}\right.$$

$$(5a)\ldots\ldots \log K = 2\left\{\frac{\alpha ax+\beta by+\ldots}{\alpha a+\beta b+\ldots} + \frac{1}{3}\left(\frac{\alpha ax+\beta by+\ldots}{\alpha a+\beta b+\ldots}\right)^3 + \frac{1}{5}\left(\frac{\alpha ax+\beta by+\ldots}{\alpha a+\beta b+\ldots}\right)^5 + \text{etc.}\right.$$

Therefore—

$$(6)\ldots\ldots \log H - \log K = \frac{2}{3}\left\{\frac{\alpha ax^3+\ldots\text{ etc.}}{\alpha a+\ldots\text{ etc.}} - \left(\frac{\alpha ax+\text{ etc.}}{\alpha a+\text{ etc.}}\right)^3\right\} + \frac{2}{5}\left\{\text{etc.}-\text{etc.}\right\} + \text{etc}$$

Thus the first and large term of the expressions for the logarithms of H and K agree, but the second and subsequent terms differ. The unequivocal condition that these terms shall be equal is that the prices have all increased or all diminished in the same ratio, viz., that $x = y = z$, etc., in which case the second terms become $\frac{2}{3}\,x^3$ in each case, the third $\frac{2}{5}\,x^5$, and so on: that is, the two expressions are then equal throughout. We shall shew also that in all practical cases they are equal; and first we note that the quantities αa, βb, etc., are always positive, but that x, y, z, etc., may be all positive, all negative, or may not be all of one sign: the latter is ordinarily the case. The quantities being of the same order of magnitude, it is obvious that the difference between the terms would be greatest when they are all of the same sign. We consider the case, therefore, where $a a = \beta b =$ etc., but $y = 2x$, $z = 3x$, etc., In this case the average value for x, y, etc., will be $\frac{1}{2}(n+1)x = \xi$ say, n being the number of commodities. Consequently we shall have for the value of the two cubic terms—

$$\frac{2}{3} \quad \frac{a a x^3 \Sigma^n n^3}{a a n} = \frac{1}{6n}\left\{ n(n+1) \right\}^2 x^3 = \frac{4}{3}\frac{n}{n+1}\xi^3 \text{ and } \frac{2}{3}\left(\frac{a a \Sigma_1^n n x}{a a n} \right)^3 = \frac{2}{3} \; \xi^3$$

The difference, therefore, in this instance is—

$$\log H - \log K = - \; \frac{2}{3} \; \xi^3 \; \frac{n-1}{n+1}$$

which is $\frac{2}{3}\ \xi^3$ when n is infinite, and is only about 2% short of $\frac{2}{3}\ \xi^3$ when n is 100.

If further, we suppose that $\beta b = 2 a a$; $\gamma c = 3 a a$, etc., and $y = 2x$, $z = 3x$, etc., as before, we shall have instead of the above—

$$\frac{16}{45} \cdot \frac{2n+1}{(n+1)^3} \; (3n^2 + 3n - 1)\, \xi^3 \text{ and } \frac{16}{81}\left(\frac{2n+1}{n+1}\right)^3 \xi^3$$

the difference of which is—

$$\log H - \log K = \frac{\xi^3}{405} \cdot \frac{2n+1}{(n+1)^3} \left\{ 144\,(3n^2 + 3n - 1) - 80\,(2n+1)^2 \right\}$$

which has a value of about 0.56 ξ^3 when $n = 100$.

In examples practically occurring we can never have the average value of ξ as great as, say, $\frac{1}{5}$, viz., its value when all commodities have on the average advanced about 50%. Hence ξ^3 is less than $\frac{1}{125}$, and in the three cases considered for 100 commodities, the difference would be 0, or less than $\frac{2}{375}$ and $\frac{1}{250}$ respectively. This is the difference in the two logarithms, but each is ordinarily the logarithm of a number somewhere near unity, and consequently represents approximately the ratio of the error itself.

It has thus been proved that H and K are sensibly equal in the circumstances of the case under consideration. It is obvious from this that, if the use of weighted price-ratios is deemed to be justified on the ground of any supposed generality in combining different measures of the exchange-value of money, then it follows from formula (6) that the method of ratios of aggregate expenditures, formula (3), is also valid. It is certainly the simpler to use, and computation of price-indexes is greatly facilitated by its use. This, however, while not unimportant, is not its chief merit, which is that *the computer sees clearly what he is doing*, while in the use of price-ratios it is by no means obvious that improper weighting vitiates the results. It is now seen that *the method of price-ratios with inaccurate weights is sensibly equivalent to forming an aggregate with units which do not represent the actual average usage.*

It has been already indicated that the *weighted geometric mean* of the price-ratios is alone valid, and it has been shewn that the method of deducing price-indexes from the ratio of aggregates of expenditure, based on the use of a constant number of units, is substantially identical therewith. It now remains to consider the method of arithmetic means, not unfrequently used.

The following demonstration that even the weighted arithmetic mean is invalid is therefore not unimportant. That the *unweighted mean* is quite invalid can be readily seen to be a consequence of the preceding proof of the approximate identity of the aggregate expenditure and price-ratio methods of deducing price-indexes. But we shall now examine the question of the legitimacy of using a weighted mean in another way.

7. **Invalidity of Arithmetic Mean.**—Using the suffixes preceding and following I, the price-index, to denote the dates to which it applies, we have by the method of the arithmetic mean of weighted price-ratios

$$(7) \ldots\ldots\ldots \; {}_0I_1 = \frac{up + vq + wr + \text{etc.}}{u + v + w + \text{etc.}}$$

Hence if we make date 1 the basis, and obtain the price-index for date 0 in relation thereto, we ought to obtain by the same process—

$$(7)\ldots\ldots\ {}^{1}I_{0} = \frac{u\frac{1}{p} + v\frac{1}{q} + w\frac{1}{r} + \text{etc.}}{u + v + w + \text{etc.}}$$

since each price-ratio is the reciprocal of the former, and this expression (7*a*) should equal the reciprocal of the preceding one, viz., (7) that is, if the method were arithmetically valid. But if this equality held we should have—

$$(u+v+w+\text{ etc.})^2 = (up + vq + wr + \text{etc.})\ (u\frac{1}{p} + v\frac{1}{q} + w\frac{1}{r} + \text{ etc.})$$

We see, that so far as the sum of the squares of the quantities u, v, etc., is concerned, the two sides are identical, but so far as the products in pairs go the right hand side is always greater than the left when p, q, etc., are not equal. Or, limiting the consideration to two price-ratios, we have to shew that—

$$\frac{\frac{u}{p}+\frac{v}{q}}{u + v} \text{ should equal } \frac{u + v}{up + vq}$$

if the method be arithmetically consistent. Multiply both expressions by $(u + v)$ $(up + vq)$, we then have :—

$$u^2 + \left(\frac{p}{q}+\frac{q}{p}\right) uv + v^2 \text{ should equal } u^2 + 2uv + v^2$$

that is, $p/q + q/p$ should equal 2. It, however, always exceeds that quantity unless $p = q$. The method of taking weighted arithmetic means, formula (7) is consequently arithmetically invalid, *being irreversible*; in other words, *if price-indexes for a series of years are computed by the formula, they do not furnish the same ratios among one another as are furnished by the original data using the same process.*

The weighted geometric mean, on the other hand, formula (1), is consistent, and furnishes a series of price-indexes which furnish the same ratios as are furnished by the original data.

8. **Comparisons of Price-Indexes when Alterations in the List of Commodities or in the Units Adopted have been made.**—It has already been pointed out that if price-indexes are to be strictly accurate, then change of regimen, that is to say, either a change in the actual list of commodities or in the units adopted for individual members of the list, cannot be admitted, otherwise *variation in the exchange-value of gold becomes confused with the effect of change of regimen.* The conception that new commodities may also furnish additional evidence of the exchange-value of gold is valid only when they belong to both periods to be compared. More definitely, if α, β, γ, δ, etc., denote the numbers of units of the commodities A, B, C, D, etc., we cannot compare regimen $\alpha A + \beta B + \gamma C$ etc., with say $\beta_1 B + \gamma_1 C + \delta_1 D$ etc., though we could of course, as already shewn, compare regimen $\beta B + \gamma C$ with $\beta_1 B + \gamma_1 C$, the commodities B and C being common to both. Thus comparison can be made for example by assuming an arithmetic mean regimen, viz., $\frac{1}{2}(\beta+\beta_1) B + \frac{1}{2}(\gamma+\gamma_1) C +$ etc., to apply to the dates to be compared.

While the above statement is true, it is also true that the validity of any computation of price-indexes becomes of questionable value if the adopted list of commodities with assigned units of usage, (or price-ratios with their assigned weights) fails to coincide with the usage of the group of nations aggregated for international comparisons. The two things to be attended to are (i.) what may be called *arithmetical validity*, and (ii.) *conformity to economic facts.* From this point of view, it is to be regarded as inevitable that in the course of time changes will occur both in the commodities and their units of usage (or the weights assigned to their changes of price-ratios) in the international list. A revision, therefore, could perhaps be made every ten years, and the question then arises whether continuity in the exchange-value relation can be established, and if at all, in what way.

Let us suppose that, for one decennium, say, the comparisons have been based upon m commodities, and that then a change is made, and comparisons are afterwards based on n commodities. Of these m and n commodities let us suppose also that there are k common to each series; and moreover, that the units used (or the series of weights assigned to price-ratios) used are not the same on the two occasions. We have already shewn that in such a case we can found a comparison only on some common regimen, preferably the arithmetic mean of the units used (or, if price-ratios are used, the mean of the weights assigned to the prices of these k commodities).

Primarily it is to be observed that *strictly we can make a comparison only through the k commodities constituting that part of the regimen common to the two periods.* This is evident from the fact that change of regimen produces its own effect on the aggregate of a list of commodities, or on the weighted mean of price-ratios, the exchange-value of money being constant. And it is for this reason that, if we want to compare the exchange-value at any two periods we can do so only on some given number of units of a group of commodities existing at both periods; and to have the highest significance these assigned units of usage should, *as near as possible*, express the actual usage at either date, and hence may be taken as the arithmetical mean of the units at either date or of the weights used in connection with the price-ratios. For the method of aggregates the units may be the arithmetical means of the units used in either.*

It is obvious from this that *there can be no real continuity in a series of price-indexes where the series of commodities used or the units of usage have changed, or where the weights assigned to the price-ratios of individual commodities have altered.* For this reason, when a change of basis is made, the results should be computed on the old basis for the first year of the new series. Thus for this year the aggregates are formed on both bases, the one giving the closing value of the price-indexes, and their value is the factor to be used for the results given in the new series. The supposition, however, that by this process the second series of price-indexes is *perfectly* continuous with the old series is subject to some qualification, for the new series cannot strictly be referred back in this way. A perfect comparison between any two periods can be made only on the basis of the average usage of the series of commodities common to the two dates, the units assigned being a mean of the units assigned for the two dates.

To express the whole matter definitively, let Σ_0, Σ_1, etc., denote respectively the aggregates $\alpha' a_0 + \beta' b_0 +$ etc.; $\alpha' a_1 + \beta' b_1 +$ etc.; $\alpha' a_j + \beta' b_j +$ etc.; the units α', β', etc., denoting the quantities regarded as constant throughout the first period (say a decennium). At the end of this period a change is made in the commodities and the units; viz., for the date denoted by j (j would be 10 if the change were decennial), and α'', β'', etc., are the units used in the second period.

Then we can obtain an *imperfect continuity* of the exchange-values by forming the price-indexes according to the following scheme, viz.:—

$$(8) \ldots\ldots \; {}_0I_1 = \Sigma_1 / \Sigma_0 \,; \; {}_0I_2 = \Sigma_2 / \Sigma_0 \,; \; \ldots\ldots \; {}_0I_j = \Sigma_j / \Sigma_0 \,; \text{ etc.}$$

Then if for Σ_j we form a second sum, using the new units and denote this by Σ'_j, we shall have—

$$(9) \ldots\ldots \; {}_0I_j = \Sigma_j / \Sigma_0 \,; \; {}_jI_{j+g} = \Sigma'_{j+g} / \Sigma_j \,; \; {}_0I_{j+g} = (\Sigma_j / \Sigma_0)\,(\Sigma'_{j+g} / \Sigma'_j).$$

in which g denotes any year in the second period; or fully expressed:—

$$(10) \ldots\ldots \; {}_0I_{j+g} = {}_0I_j \,.\, {}_jI_{j+g} = \frac{\alpha' a_j + \beta' b_j + \text{etc.}}{\alpha' a_0 + \beta' b_0 + \text{etc.}} \,.\, \frac{\alpha'' a_{j+g} + \beta'' b_{j+g} + \text{etc.}}{\alpha'' a_j + \beta'' b_j + \text{etc.}}$$

It is obvious from this last expression that any dissimilarity in the aggregate of the units of usage for the two periods does not prejudice the results, directly. Nevertheless it is equally obvious that the results of the second period are *not* strictly comparable with those of the first period. For the proper relation between any two results should be based on the mean number of units used for the two dates, and thus would be as follows:—

Let α denote $\frac{1}{2}(\alpha' + \alpha'')$; β denote $\frac{1}{2}(\beta' + \beta'')$; etc. Then the results for the year say 0 and the year $j + g$ should be

$$\text{Correct result—} \quad {}_0I_{j+g} = \frac{\alpha a_{j+g} + \beta b_{j+g} + \text{etc.}}{\alpha a_0 + \beta b_0 + \text{etc.}}$$

The tabular results according to formula (10) would, however, differ from this. The measure of this difference we propose now to determine, and we consider first the case *where the changes in the number of units of usage are relatively small*, and where

* This, as has been shewn, gives in general almost the same results as the geometric mean.

the commodities are the same. In this case we may put $a' = a(1-x)$ and $a'' = (1+x)$; $\beta' = \beta(1-y)$, and $\beta'' = \beta(1+y)$, etc., then by interchanging the factors of the numerators the expression (10) may be written—

$$(11) \ldots \frac{a(1+x)\,a_{j+g}+\beta(1+y)\,b_{j+g}+\text{etc.}}{a(1-x)\,a_0+\beta(1-y)\,b_0+\text{etc.}} \cdot \frac{a(1-x)\,a_j+\beta(1-y)\,b_j+\text{etc.}}{a(1+x)\,a_j+\beta(1+y)\,b_j+\text{etc.}}$$

$$=\frac{aa_{j+g}+\beta b_{j+g}+\text{etc.}+(xaa_{j+g}+y\beta b_{j+g}+\text{etc.})}{aa_0+\beta b_0+\text{etc.}-(xaa_0+y\beta b_0+\text{etc.})}\times\frac{aa_j+\beta b_j+\text{etc.}-(xaa_j+y\beta b_j+\text{etc.})}{aa_j+\beta b_j+\text{etc.}+(xaa_j+y\beta b_j+\text{etc.})}$$

If S denote the sum of the quantities outside the brackets, and s the sum of the quantities within the brackets, then this last expression may be written—

$$(12) \quad \frac{S_{j+g}+s_{j+g}}{S_0-s_0}\cdot\frac{S_j-s_j}{S_j+s_j}=\frac{S_{j+g}}{s_{j+g}}\cdot\frac{\left(1+\frac{s_{j+g}}{S_{j+g}}\right)\left(1-\frac{s_j}{S_j}\right)}{\left(1-\frac{s_0}{S_0}\right)\left(1+\frac{s_j}{S_j}\right)}$$

Now S is a very large quantity compared with s, therefore s/S is a very small quantity compared with unity, and consequently the right-hand factor in this last equation (with four brackets) must be very nearly unity. It can be seen somewhat more clearly if we put

$$(13) \ldots\ldots S = \frac{1}{3}(S_0+S_j+S_{j+g});\; s=\frac{1}{3}(s_0+s_j+s_{j+g});$$

and also

$$(13a) \ldots\ldots S_0 = S(1+\xi);\; S_j = S(1+\eta);\; S_{j+g}=S(1+\zeta);$$

and

$$(13b) \ldots\ldots s_0 = s(1+\chi);\; s_j = s(1+\phi);\; s_{j+g}=s(1+\psi);$$

so that we shall have

$$(13c) \ldots\ldots \xi+\eta+\zeta=0;\text{ and } \chi+\phi+\psi=0.$$

The expression (12) then becomes—

$$(14) \ldots\ldots {}_0I_{j+g} = \frac{S_{j+g}}{S_0}\cdot\frac{\left\{1+\frac{s}{S}\left(\frac{1+\psi}{1+\zeta}\right)\right\}\left\{1-\frac{s}{S}\left(\frac{1+\phi}{1+\eta}\right)\right\}}{\left\{1-\frac{s}{S}\left(\frac{1+\chi}{1+\xi}\right)\right\}\left\{1+\frac{s}{S}\left(\frac{1+\phi}{1+\eta}\right)\right\}}$$

It is obvious that in this expression the whole of the terms denoted by Greek letters are small terms, and are also terms of the same order; and it is evident, therefore, that unless prices or weights change very greatly the right-hand factor may be taken as unity.

It may be pointed out that in actual cases the quantities S_0, S_j, and S_{j+g} are sensibly identical to the order of, say, several per cent. only; and s_0, s_j, and s_{j+g} are usually very small; hence this factor in brackets will in general be so near unity as often to be satisfactory. In other words, the quantities xaa, $y\beta b$ etc., are of a much smaller order than aa, βb, etc., and, entering into the result some with the + and others with the − sign, tend consequently to disappear in the final result.

It may be proper here to note that this last expression shews at once the advantage of the weights being so determined that, for the year on which the basis is changed, the aggregate of expenditures calculated with the two systems of weights shall be identical; for in such a case the values of a' and a'', β' and β'', etc., differ on the average the least possible. We may say finally that if the value of the right-hand factor of (12) (viz., that containing the four quantities in brackets) is unity then the continuity is satisfactory; if not, then it is unsatisfactory, and in proportion as it differs from unity: this expression or its equivalent (14) affords, therefore, the necessary criterion.

We shall see later that it is desirable that the units for the second period should be so determined that for the year of change $\Sigma_j = \Sigma'_j$. As soon as the relative numbers α'', β'', etc., of the various units have been ascertained, this can readily be effected by multiplying these by an appropriate factor, κ, given by the formula

$$(15) \quad \ldots\ldots \quad \kappa = \frac{\Sigma_j}{\Sigma'_j} = \frac{\alpha' a_j + \beta' b_j + \text{etc.}}{\alpha'' a_j + \beta'' b + \text{etc.}}; \text{ that is } \kappa\,(\alpha'' a_j + \text{etc.}) = \alpha' a_j + \text{etc.}$$

Thus we obtain a new set ($\alpha''' = \kappa\alpha''$, $\beta''' = \kappa\beta''$, etc), proportional to those ascertained, viz., α'''; β''', etc. When this has been done, then the aggregate expenditure based on the corrected units for the second period is identical with the aggregate expenditure based on the units for the original period, notwithstanding that the system of units has been altered. That is, for the year of change the aggregate expenditure is unaltered, but the distribution among the commodities has been changed.

9. **Price-Indexes when the Number of Commodities is greatly changed.**—We now pass to the consideration of the case where only some of the commodities are common to the two series, and the weights on the occasions compared are very different. In such a case we can continuously trace an exchange-value relation only through the k commodities common to the two groups, and the only theoretically satisfactory comparison is one where the two periods are compared on an identical basis, viz., the arithmetic mean (or more strictly on the geometric mean) of the two series of units. In practical examples it is probable that it is never necessary to use the geometric mean, for in all practical cases the change of regimen from decennium to decennium can hardly be such as to involve very great differences of weights, or even to involve the alteration of a very large number of commodities. The determination of relations of k commodities of different weights in the series of commodities for the two periods will not therefore be unsatisfactory. In fact, it may be said that in almost every practical example the two means (arithmetic and geometric) will give practically identical results.

The reason of this is that the two means rarely differ very much, as will be seen from the following table, the original unit being 1:—

(a) Number of new units N =	1	2	3	4	5	9	10	19
(b) Arithmetic mean ..	1	$1\frac{1}{2}$	2	$2\frac{1}{2}$	3	5	$5\frac{1}{2}$	10
(c) Geometric mean ..	1	1.41	1.73	2.0	2.24	3	3.16	4.36
$(b-c)/c$ Percentage of difference divided by N :	0	3.03	5.16	6.25	6.83	*7.41	7.39	6.81%

* Maximum value.

From this table it is seen that if the new units be N times the preceding units the arithmetic mean will exceed the geometric mean by never more than 7.4 N per cent. of the latter. Consequently whatever mode we assume for the growth of the unit from one value to another we may take the arithmetic mean of the units in practical examples.

Reverting to formula preceding, and remembering that the sum in these cases is for the k commodities only, it will still be true that the product of the bracketed quantities in (12) and (14) will be sensibly unity for contiguous decennial periods. In this instance a kind of general continuity can be established even though the regimen is changed (it may be) *per saltum* each decennium. We proceed to elaborate the question. Whenever the number of commodities has been changed the question of continuity can be tested in the following manner, viz. :—

Let R denote the computed aggregate of expenditure on the commodities which appear in the old but not in the new list ; S and S' denote the aggregate of expenditures on the continued commodities, viz., those appearing in both the old and new lists ; T' the aggregate of expenditure on those appearing in the new list only, and let as before the suffixes denote the year to which the expenditure refers. When the relative values of the units to be used for the new period (that is, for expenditure $S' + T'$) have been found, then these units must be so corrected, see formula (15), that the expendit[illegible] the k commodities whose aggregate is S or

S' shall be identical, whether calculated by the new or by the old units. Then we shall have $\kappa S' = S$, and $\kappa T' = T$, so that S is identical with either series of units, and T is calculated on the *corrected* relative units (the correction making of course no change in their ratio to one another). Then we have by an operation similar to formula (10).

$$(16) \ldots\ldots {}_0I_{j+g} = \frac{S_j + R_j}{S_0 + R_0} \; \frac{S_{j+g} + T_{j+g}}{S_j + T_j} = \frac{S_{j+g}}{S_0} \cdot \left[\frac{1 + \dfrac{R_j}{S_j}}{1 + \dfrac{T_j}{S_j}}\right] \cdot \left[\frac{1 + \dfrac{T_{j+g}}{S_{j+g}}}{1 + \dfrac{R_0}{S_0}}\right]$$

Now, since S_j / S_0 is continuous under the old system of units, and S_{j+g} / S_0 is continuous under the new system; S_{j+g} / S_0 is at least what we have called pseudo-continuous through the entire period, this pseudo-continuity being attained by the correction of the units, so that the aggregate of expenditure on the k commodities is identical with either system of units.

It can be seen from the above expression that if in introducing new commodities we take care that the aggregate expenditure on these, with corrected units, exactly equals the expenditure on those omitted at the year of change, we secure this, viz., that the left-hand term in brackets in formula (16) shall be unity, and further that the fractional terms on the right-hand term in brackets shall be of the same order and also in most cases sensibly equal. For this reason it is eminently desirable that the units be so determined that the whole aggregate of expenditure shall be identical with the new units as well as the aggregate for the commodities common to both groups. Then if the quantity in the right hand brackets is sensibly unity we can regard the pseudo-continuity as established. In practical examples g should be one, that is the example should apply to the year immediately following that in which the change in the commodities and units is made.

Where it is desired to add a number of commodities such that the expenditure thereon is large as compared with expenditure on those omitted, we rewrite the terms in brackets in (16)

$$(16a) \ldots\ldots {}_0I_{j+g} = \frac{S_{j+g}}{S_0} \left[\frac{1 + \dfrac{R_j}{S_j}}{1 + \dfrac{R_0}{S_0}}\right] \cdot \left[\frac{1 + \dfrac{T_{j+g}}{S_{j+g}}}{1 + \dfrac{T_j}{S_j}}\right]$$

In this R_j / S_j is a quantity which is ordinarily nearly equal to R_0 / S_0, and also T_{j+g} / S_{j+g} is ordinarily comparable to T_j / S_j. When this condition happens to be satisfied the continuity may be satisfactory despite the fact that a relatively large addition of commodities has been made as compared with those omitted.

10. **Effect of Change of Regimen.**—When the product of the factors in (16) and (16a) is not unity, then they exhibit approximately the consequence of change of regimen.

In connection with a discussion on the variation of the exchange-value of gold the effect of change of regimen is to be carefully distinguished from mere variation in the magnitude of the units. It can best be illustrated thus:—

Suppose that, with the same list of commodities for any datum year, and using two series of units, we have *equal expenditures*, agreeably to the prescription of formula (15), and find with the prices for any other year a difference of expenditure, this difference measures the effect of change of regimen. To express this otherwise suppose that I and I' denote the price-index as deduced with an identical list of commodities but with two series of units, of which let us assume I is on an original, and I' on a new basis, the expenditures being identical for the datum year. Then we have for ρ the effect of the change of regimen.

$$(17) \ldots\ldots \rho = I'/I.$$

Each year will, of course, give a different value for ρ, but if actual results shew that the variations of ρ are very small, we can regard the (weighted) mean as furnishing a general measure of the effect of the change. As the distance in time increases from the datum year, the individual values obviously become of less weight. Hence we may empirically adopt some such formula as

$$(18) \ldots \rho_m = \frac{\Sigma \dfrac{\rho_n}{n}}{\Sigma \dfrac{1}{n}}; \text{ or } \frac{\Sigma \dfrac{\rho_n}{n}}{1 + \frac{1}{2} + \frac{1}{3} + \ldots + \frac{1}{n}} = \frac{\Sigma \dfrac{\rho_n}{n}}{0.577216 + 2.3025851 \log_{10} n + \dfrac{1}{2n} - \dfrac{1}{12n^2} + \dfrac{1}{120n^4}}$$

if we have the values of this factor for successive years 1, 2, 3 . . . . . . n. In general the variations of ρ will exhibit variations shewing no definite tendency; when this is not the case the progressive change may demand special investigation.

11. **Pseudo-Continuity of Price-Indexes with Progressive Change of Regimen.**—For comparative purposes stretching over long periods of time it would appear on the whole desirable to adopt a method, which would be sensibly accurate for short periods of time from the standpoint of the exchange-value of gold, and yet nevertheless represent for long periods the combined effect of change of regimen and altered exchange-value or purchasing-efficiency of gold, the change of regimen corresponding to variations in the international usage from period to period. Under such a system the ratio of price-indexes for distant dates would, strictly speaking, then cease to represent changes in the exchange-value of gold but rather those changes as modified by an alteration of the average regimen. Comparisons from the standpoint of variations in the exchange-value of gold alone would have to be dealt with by special investigations where necessary. We proceed now to consider the question.

The fundamental idea on which a pseudo-continuity can be developed is that for the years of change (constituting what we shall call the successive control years), the change of units shall be so controlled that the aggregate of expenditure on the k commodities, common to the two groups, shall be identical with the two series of units (formula 15). This gets rid, in probably the most convenient way, of the difficulty that in general we cannot ascertain the *absolute*, but only the relative, number of units used of each commodity.

It will facilitate the explanation to describe the method schematically, and the method can best be illustrated as follows:—

	Commodities disappearing.	Commodities constant to both periods.	Commodities being introduced.
1900	A B C—————	—————D E F G H	I K L M
1910	A B C	D E F G H—————	—————I K L M

Let 1900 be the last year when commodities say A to H, are to be fully included. It is decided in 1910 to revise the list so that it shall contain commodities D to M, but not A to C. In this case 1901 is to be regarded as the change year. For this year we must see that the aggregate of expenditure on D to H is equal as required by formula (15); and must see also that, using the old units for A to C, the aggregate of expenditure is equal (approximately) to that on D to M working with the corrected units. When this has been done we decrease the units of A, B, C, yearly by one-tenth of the original amount, and increase those of I, K, L, M, yearly one-tenth of their weight for 1900, according to the following scheme, viz.:—

Units for Commodities.	Factor corresponding to year.					
	1900	1901	1902	....	1908	1909	1910
α, β, γ*	$\frac{10}{10}$	$\frac{9}{10}$	$\frac{8}{10}$	....	$\frac{2}{10}$	$\frac{1}{10}$	$\frac{0}{10}$
$\iota, \kappa, \lambda, \mu$†	$\frac{0}{10}$	$\frac{1}{10}$	$\frac{2}{10}$	....	$\frac{8}{10}$	$\frac{9}{10}$	$\frac{10}{10}$

* Units of commodities disappearing. † Units of commodities being introduced.

Thus in this scheme A, B, C, have entirely disappeared in 1910, and I, K, L, M, have appeared with their full values in the same year, while intermediately one series is increasing and the other is diminishing. We also change each of the units for the commodities D to H one-tenth of their difference yearly so that the new values are reached in 1910. That is, if δ' denote the corrected weight in 1910, and δ the weight in 1900, the weight for 1900 + n years (n being less than 10), will be

$$(19) \;\ldots\ldots\ldots\; \delta + \frac{n}{10}(\delta' - \delta) = \frac{10 - n}{10}\,\delta + \frac{n}{10}\,\delta'.$$

A very simple numerical illustration will shew the effect of the process, and for this purpose we need take only two commodities which we may suppose to represent the continuous series. These will illustrate the nature of the difference of the two methods. Let us then suppose a regimen of commodities in the first years of a series to be in the ratio of 1 of A to 2 of B: and for the fifth year to be 2.7 of A to 2.4 of B.

We first find by formula (15), see hereinbefore, that with the prices as at the final or control year—

$$I = \frac{2}{3} \text{ viz., } \frac{1 \text{ @ } 4 + 2 \text{ @ } 8}{2.7 \text{ @ } 4 + 2.4 \text{ @ } 8} = \frac{20}{30}.$$

Hence the units become 1.8 and 1.6, that is—

$$1 \text{ @ } 4 + 2 \text{ @ } 8 = 1.8 \text{ @ } 4 + 1.6 \text{ @ } 8.$$

We thus obtain the results in the table hereunder, viz.:—

(i.) for the method of continuously depending upon the original number of units of k commodities, and

(ii.) for the method of changing the units yearly, respectively—

Computation with unchanged weights.						Computation with changed weights.				
Year.	Units. A	Price of A	Units. B.	Price of B	Aggregate. (i.)	Changing Units. A	Price. A	Changing Units. B	Price. B	Aggregate. (ii.)
1 ..	1	3	2	10	23	1.0	3	2.0	10	23
2 ..	1	4	2	8	20	1.2	4	1.9	8	20
3 ..	1	$2\frac{1}{2}$	2	7	16	1.4	$2\frac{1}{2}$	1.8	7	16.1
4 ..	1	5	2	9	23	1.6	5	1.7	9	23.3
5 ..	1	4	2	8	20	1.8	4	1.6	8	20

It is easy to see that the control which ensures the identity of the final aggregates (i.) and (ii.) for year 5, ensures also that the intermediate values for years 2, 3 and 4 shall substantially agree. Similarly, since for the change-year the expenditure on the commodities added is to balance that on those subtracted, we shall get a satisfactory continuity through that year, and thus results which shew the effect *mainly* of change of price, though modified slightly by change of regimen.

12. **Suggested List of Commodities and Scheme of Working.**—The following table shews the commodities included by various authorities in compiling Index-Numbers for different countries. In this tabular statement only commodities which are common to more than three of the 27 index-numbers have been included; commodities which are included in only one or in either two or or three of the index-numbers are specified in the notes at the end of the table. Where any commodity is included in more than three of the index-numbers the fact is indicated by a cross (X); in every case where more than one grade or quality of any commodity is included the small number shewn in brackets after the cross specifies the number of grades or qualities.
Take in Table.

Commodities included in

Commodity.	Great Britain.							Germany.				
	Bishop Fleetwood, 1707.	Economist, 1845–1911.	Bourne, 1851–1879	Palgrave, 1865–1886.	Jevons, 1792–1865.	Sauerbeck, 1846–1911.	Board of Trade, 1871–1911.	Laspeyres, (Hamburg) 1831–1863.	Paasche (Hamburg), 1847–1872.	V'nderB'rght (Hamburg), 1847–1880.	Conrad (Hamburg), 1871–1898.	Soetbeer (Hamburg), 1847–1891.
No. ofCommodities	39	22	20	22	39	39	45	48	47	22	47	114
Metals and Coal												
Coal	..	..	X	..	..	X(2)	X	X	X	X	X	X
Copper	..	X	X	X	X	X(2)	X	X	X	X	X	X
Iron	..	X	X	X	X(2)	X(2)	X	X	X(2)	X	X(2)	X(3)
Lead	..	X	X	X	X	X	X	X	X	X	X	X
Silver	..	..	..	..	X	..	..	..	..	..	..	..
Tin	..	X	X	X	X	X	X	X	X	X	X	X
Zinc	..	..	..	..	..	..	X	X	X	X	X	X
Textiles, etc.												
Hides	X	..	..	..	X	X(2)	X	X	..	..	..	X
Leather ..	..	X	X	X	X	X	..	X	..	..	..	X
Tallow	..	X	X	X	X	X(2)	..	..	X	..	X	X
Cotton, Raw ..	..	X(2)	X	X(2)	X(3)	X(2)	X	X	X	X	X	X
,, Cloth ..	..	X	..	X	..	..	..	..	..	..	..	X(3)
,, Yarn ..	..	X	..	X	..	..	..	..	X	..	X	X
Flax	X	X	X	X	X	X(2)	X	X	X	..	X	X
Hemp	..	X	X	X	X	X(2)	..	X	X	..	X	X
Jute	..	..	..	..	..	X	X	..	..	..	..	..
Linen	..	..	..	..	..	..	..	..	X	..	X	X(2)
Silk, Raw ..	..	X	X	X	X	X	X	..	X	X	X	X
Wool	X	X	X	X	X	X(3)	X(2)	X	..	..	X	X
Woollen Yarn ..	..	..	..	..	..	..	..	..	X	..	..	X(2)
Agricultural Produce												
Barley	X	..	..	..	X	X	X(2)	X	X	X	X	X
Beans	X	..	..	..	X	..	..	..	..	..	..	X
Clover	..	..	..	..	X	..	..	X	X	..	X	X
Hay	X	..	..	..	X	..	..	..	..	..	..	..
Linseed ..	..	..	..	..	..	X	X	..	..	..	..	..
Maize	..	..	..	..	..	X	X	..	..	..	..	..
Oats	X	..	..	..	X	X	X(2)	X	X	X	X	X
Peas	X	..	..	..	X	..	..	..	..	..	..	X
Rape Seed ..	..	..	..	..	..	..	..	X	X	..	X	X
Rice	..	..	..	..	..	X	X	X	X	X	X	X
Rye	X	..	..	..	X	..	..	X	X	X	X	X
Straw	..	..	..	..	X	..	..	..	..	..	..	..
Wheat	X	X	X	X	X	X(2)	X(2)	X	X	X	X	X
Dairy Produce.												
Bacon	..	..	..	..	..	X	X	..	..	..	..	..
Butter	..	..	..	..	X	X	..	X	X	..	X	X
Cheese	X	..	..	..	..	..	..	X	..	..	..	X
Eggs	X	..	..	..	..	..	X	..	..	..	..	X
Milk	X	..	..	..	..	..	X	..	..	..	..	X
Groceries, etc.												
Almonds ..	X	..	..	..	..	..	..	X	X	..	X	X
Cocoa	..	..	..	..	..	..	X	X	X	X	X	X
Coffee	..	X	X	X	..	X(2)	X	X(3)	X	X	X	X
Currants ..	..	..	..	..	..	..	..	X	X	..	X	X
Flour	..	..	..	..	..	X	..	X	..	..	..	X
Hops	..	..	..	..	..	..	X	..	X	..	..	X
Lard	..	..	..	..	..	..	..	..	X	..	X	X
Malt	X	..	..	..	..	..	..	..	..	..	..	X
Pepper	..	..	..	..	X	..	..	X	X	X	X	X
Potatoes ..	..	..	..	..	..	X	..	..	..	..	..	X
Raisins	X	..	..	..	..	..	..	X	X	..	X	X
Rye Flour ..	..	..	..	..	..	..	..	..	..	..	..	X
Salt	X	..	..	..	..	..	..	..	..	..	..	X
Spirits	..	..	..	..	X	..	X	X(2)	..	..	..	X(3)
Sugar	..	X	X	X	X	X(3)	X	X(2)	X	X	X	X(2)
Tea	..	X	X	X	X	X(2)	X	X	X	X	X	X
Tobacco ..	..	X	X	X	..	..	X	X	..	..	..	X
Meat, Etc.												
Beef	..	X	X	X	X	X(2)	X	X	..	..	..	X
Mutton	..	..	..	..	X	X(2)	X	..	..	..	..	X
Pork	..	..	..	..	X	X	..	X	..	..	..	X
Sheep	X	..	..	..	..	..	..	..	..	..	..	..
Fish	X	..	..	..	..	..	X	X	X	..	X	X(2)
Building Materials.												
Bricks	..	..	..	..	..	..	X	..	..	..	..	..
Timber	..	X	X	X	X	X(2)	X	..	..	..	..	..
Miscellaneous.												
Caoutchouc ..	..	..	..	..	..	..	X	..	..	..	..	X
Indigo	..	X	X	X	X	X	..	X	X	X	X	X
Oils	..	X	X	X	X(2)	X(3)	X(2)	X	X(4)	X(2)	X(5)	X(5)
Saltpetre ..	..	..	..	..	..	..	..	X	X	X	X	X
Soda	..	..	..	..	..	X	..	X	..	..	..	X

Commodities not common to more than three of the above index-numbers have been excluded from the computation of each index-number, but not shewn

various Investigations.

Germany			A'stria Hun-gary.	France			Italy.	Switz-erland	India.	U.S. of America		C'nada	Australia.	
Prussia Government, 1840–1891.	German Em. Government, 1879–1911.	Hooker, 1890–1910.	Government, 1830–1890	Palgrave, 1865–1884.	Falkner, 1861–1910.	Hooker, 1890–1910.	Government, 1862-85	Walras, 1871–1884.	Atkinson, 1871–1895.	Aldrich, 1840–1891.	Bureau of Labour, 1890–1911	Coats, 1890–1911	Wholesale, 1871–1912.	Retail, 1901–1912.
17	37	40	9	22	38	40	6	20	45	223	257	230	80	46
..	X	X(2)	..	X	X	X(2)	..	..	X	X(8)	X(7)	X(3)	X	..
..	X	X	..	X	X	X	..	..	..	X(2)	X	X	X	..
..	..	X(2)	..	X	X	X(2)	..	..	..	X(4)	X(4)	X	X(7)	..
..	..	X	..	X	X	X	..	..	..	X(2)	X	X	X(2)	..
..	..	..	..	..	..	..	..	..	..	..	X	X	..	..
..	X	X	..	..	..	X	..	..	..	..	X	X	..	..
..	..	..	..	X	X	..	..	..	..	X	X(2)	X	X	..
..	..	X(2)	..	X	X(2)	X(2)	..	..	X	X	X	X	..	..
..	..	..	..	..	..	..	..	..	X	X(2)	X	X	X(3)	..
..	..	..	..	X	..	X	..	..	X	..	X	X	..	..
X	X	X	..	X	X	X	..	..	X	..	X	X	X	..
..	..	..	..	..	X	..	..	..	X	X(3)	X	X	..	..
..	..	X	..	..	X	X	..	..	..	..	..	..	..	..
..	..	X	..	..	..	X	..	..	..	..	X	..	..	..
..	..	X	..	..	..	X	..	..	..	..	..	..	..	..
..	..	X	..	..	..	X	..	..	X	..	X	X	..	..
..	..	..	..	..	..	..	..	..	..	..	X	X	..	..
..	..	X	..	X	X(3)	X	..	..	X	..	X	X	X	..
..	..	X(2)	..	X	X	X(2)	..	..	X	X(2)	X	X	X	..
..	..	..	..	X	X	..	..	..	..	..	X	X	..	..
X	X	X	X	..	..	X	..	X	..	..	X	X	X(2)	..
X	..	..	..	..	..	..	..	..	..	X	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
X	..	..	X	..	..	..	..	X	..	..	X	X	X	..
..	..	..	..	..	X	..	..	..	X	..	..	..	..	..
..	..	X	X	..	..	X	X	..	X	..	..	X	X	..
X	X	X	X	..	..	X	..	X	..	..	X	X	X	..
X	..	..	..	..	..	..	..	..	..	..	..	X	X	..
..	..	..	..	..	..	..	..	..	X	..	..	..	..	..
..	X	X	..	X	X	X	X	..	X	X	X	X	X	X
X	..	X	X	..	..	X	..	X	..	..	X	X	..	..
X	..	..	X	..	..	..	..	X	..	..	X	X	X	..
X	X	X	X	X	X	X(2)	X	X(2)	X	..	X	X	X	..
X	..	..	..	..	..	..	..	X	..	X	X	X	X	X(2)
X	..	X	..	X	X	X	..	X	X	X	X	X	X	X
..	..	..	..	..	..	..	..	..	..	X	X	X	X	X(2)
..	..	..	..	..	..	..	..	X	..	X	X	X	X	X(2)
X	..	..	..	..	..	..	..	..	..	X	X	X	..	X
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	X	..	..	..	..	..	..	X	..
..	X	X	..	X	X	X	..	..	X	X	X	X	X	..
..	..	..	..	..	..	..	..	..	..	X	X	X	X	X
..	X	..	..	..	..	X	..	..	..	X	X	X	X	X
..	..	..	..	..	..	..	..	..	..	..	X	..	X	..
..	..	X	..	..	..	..	..	X	..	X(2)	X	X	X	..
..	..	..	..	..	..	..	..	..	..	..	X	X	..	..
..	..	..	..	..	..	..	..	..	..	X	X	X	..	..
X	X	X	X	..	..	..	..	X(2)	X	X(2)	X	X	X	X
..	..	..	..	..	..	..	..	..	..	X	X	X	X	X
..	..	X	..	..	..	..	..	..	..	X	X	..	..	..
..	..	..	..	..	..	..	..	..	..	X(5)	X	X	X	..
..	..	X	..	..	..	X	..	..	..	X	X	X(3)	X(2)	..
X(2)	..	X	..	X	X	X	..	..	X	X(4)	X	X	X	X
..	..	..	..	..	..	..	..	..	X	..	X	X	X	X
..	..	X	..	X	X	..	..	..	X	..	X	X	X	..
X	..	..	X	X	..	..	X	X	X	X(3)	X	X(2)	X	X(11)
X	..	..	..	..	..	..	..	X	X	X	X	X	X	X(7)
X	..	..	..	..	..	..	..	..	..	X	X	X	X	X(4)
..	..	X	..	..	X	X	..	..	..	..	X	X	..	..
..	X	X	..	..	..	..	..	..	..	X(4)	X(4)	X(9)	X(3)	..
..	..	..	..	..	..	..	..	..	..	X	X	X	..	..
..	..	..	..	..	..	..	..	..	X	X(17)	X(10)	X	X(7)	..
..	..	..	..	..	..	..	..	..	X	X	X	X	..	..
..	..	..	..	..	..	..	..	..	X	..	..	..	..	..
X	..	X	..	X	X	X(2)	X	..	X	X	X	X	X	X
..	..	..	..	..	..	..	..	..	X	..	..	..	X	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..

the above tabular statement. The notes hereunder shew the balance of the commodities included in in the above table for the reason above assigned.

In the following notes particulars are given regarding commodities included in each of the above index-numbers, but excluded from the preceding table for the reason already stated.

Fleetwood.—Cloth, Shoes, Ploughs, Carts, Land, Horses, Cattle, Mules, Swine, Goats, Fowls, Rabbits, Pigeons, Wine, Ale, Beer, Spice, Wax, Figs, Charcoal.

Jevons.—Tin Plates, Logwood.

Sauerbeck.—Petroleum, Nitrate of Soda.

Board of Trade.—Wine, Cotton Seed, Paraffin, Petroleum.

Laspeyres.—Logwood, Calfskin, Rags, Tar, Wine.

Paasche.—Mahogany, Calfskins, Bristles, Horse-hair, Wax, Quicksilver.

Conrad.—Mahogany, Hops, Calfskins, Bristles, Horse-hair, Wax, Quicksilver.

Soetbeer.—Buckwheat, Oilcake, Veal, Calfskins, Horse-hair, Bristles, Bed-feathers, Bones, Buffalo Horns, Glue, Dried Prunes, Wine, Champagne, Allspice, Cassia Bark, Sago, Cochineal, Logwood, Rosewood, Mahogany, Rattan, Ivory, Quicksilver, Sulphur, Lime, Cement, Cordage, Rags, Guano, Gum-elastic, Resin, Pearl Ash, Pitch, Potash, Candles, Tar, Wax, Sewing Thread, Bottles, Sailcloth, Woollen Cloth, Flannels, Worsted, Carpets.

Prussian Government.—Lentils, Veal. 37 articles are given but only 15 are specified.

Hooker (Germany).—Cattle, Calves, Pigs (2), Hops, Petroleum.

Palgrave (France).—Oil-seed, Silk Stuffs, Gloves.

Falkner (France).—Beeves, Calves, Cows, Hogs, Sesamum, Lambskins, Kidskins, Silk Goods (2), Merinos, Blankets, Carpets, Tapestry, Gloves.

Hooker (France).—Cattle, Calves, Pigs, Wine, Nitrate of Soda.

Italy (Government).—Wine.

Walras (Switzerland).—Bread (2), Veal, Firewood (2).

Atkinson (India).—Mace, Millet Corn, Pulse, Fajra, other Grains, Ginger, Opium, Croton, Castor Oil, Dye, Bone Manure, Jute Goods, Silk Goods, Shellac.

Aldrich (U.S.A.).—Ship Bread (3), Boston Crackers (2), Oyster Crackers, Ship Biscuits, Soda Crackers, Dried Apples, Corn Meal, Ham, Lamb, Molasses (2), Nutmegs, Cornstarch (2), Blankets (2), Broadcloths (2), Calico, Carpets (3), Cassimeres (4), Checks, Horse Blankets, Print Cloths (2), Shawls, Sheetings, Shirtings, Ticking, Candles, Matches, Anvils, Butts, Door Knobs, Lead Shot, Locks (2), Meat Cutters, Cut Nails, Pocket Knives (25), Quicksilver, Rope (3), Saws (4), Scythes, Shovels, Wood Screws, Carbonate of Lead, Cement, Doors, Lime, Oxide of Zinc, Plate Glass (6), Putty, Tar, Turpentine, Window Glass, Alum, Potash, Vitriol, Brimstone, Calomel, Copperas, Flax Seed, Glycerine, Mercury, Muriatic Acid, Opium, Quinine, Soda Ash, Sugar of Lead (2), Sulphuric Acid, Furniture (3), Glassware (5), Pails (3), Tubs (4), Powder (2), Soap, Starch.

Bureau of Labor (U.S.A.).—Canned Corn, Canned Peas, Canned Tomatoes, Dried Apples, Prunes, Glucose, Corn Meal (2), Molasses, Fresh Vegetables, Onions, Broadcloth, Drill, Gingham, Horse Blankets, Hosiery, Overcoatings, Sheetings, Shirtings, Tickings, Underwear, Sicilian Cloth, Cashmere, Poplar, Panama, Worsted and Worsted Yarn, Candles, Matches, Augers, Axes, Barb Wire, Butts, Chisels, Copper Wire, Steel Door Knobs, Files, Hammers, Lead Pipe, Locks, Cut Nails, Wire Nails, Planes, Saws (2), Shovels, Steel Billets, Steel Rails, Steel Sheets, Trowels, Vises, Wood Screws, White Lead, Cement (2), Doors, Lime, Oxide of Zinc, Plate Glass, Putty, Resin, Shingles, Turpentine, Window Glass, Alum, Brimstone, Glycerine, Muriatic Acid, Opium, Quinine, Sulphuric Acid, Earthenware Plates, Cups and Saucers, Bed Sets, Chairs (2), Tables, Glassware (3), Cutlery, Woodenware, Cotton Seed, Meal, Newspaper, Wrapping Paper, Rope, Soap, Cattle, Fowls, Horses, Mules, Swine, Bread, Blankets, Carpets, Shoes and Boots (4), Quicksilver.

Coats (Canada).—Bran, Shorts, Turkeys, Chocolate, Cream of Tartar, Fresh Fruit (6), Honey, Maple Sugar, Oatmeal, Molasses, Tapioca, Vegetables (3), Canned Vegetables (3), Vinegar, Brass, Solder, Anvils, Axes, Grindstones, Hammers, Horse-shoes, Mallets, Picks, Screws, Soldering Irons, Vices, Coke, Carbide of Calcium, Matches, Hinges, Wire Nails, Cut Nails, Plaster of Paris, Sash Weights, Soil Pipe, Wire Cloth, Wire Fencing, Paints, Glass, Benzine, Glue, Boiled Oil, Putty, Paris Green, Shellac, Turpentine, Varnish, White Lead, Chairs, Tables, Sideboards, Bed Suites, Beds, Tumblers, Cups and Saucers, Toilet Sets, Dinner Sets, Knives, E.P. Knives and Forks, Wood Pails, Wood Tubs, Brooms, Alum, Bleaching Powder, Borax, Carbolic Acid, Caustic Soda, Copperas, Glycerine, Muriatic Acid, Opium, Quinine, Soda Ash, Sulphuric Acid, Furs (4), Binder Twine, Rope, Soap, Cattle, Beer, Shoes and Boots (3).

Australia (Wholesale).—Branbags, Cornsacks, Woolpacks, Leather (3), Bran, Pollard, Oatmeal, Ham, Honey, Macaroni, Sago, Mustard, Starch, Blue, Matches, Candles, Kerosene, Veal, Lamb, Cement, White Lead, Cream of Tartar, Sulphur.

Australia (Retail).—Bread, Sago, Jam, Oatmeal, Starch, Blue, Candles, Soap, Onions, Ham.

In addition to the authorities mentioned in the above table, investigations have also been made in the following countries, but details as to the commodities included therein are not available :—

Country.	Name of Authority.	Years.	No. of Articles.
Great Britain—	*Rice Vaughan*	1675	
	Evelyn	1798	
	Mulhall	1854–1884	50
Germany (Hamburg)—	*Kral*	1845–1884	265
	Heinz	1850–1891	180
	Schmitz	1890–1910	29
France—	*D'Avenal*	1200–1898	
	De Foville	1847–1880	
	Réforme Economique		
Belgium—	*Waxweiler*	1890–1910	
U.S. A—	*Burchard*	1825–1884	68 to 90 articles
	Falkner	1890–1899	90 articles
New Zealand—	*McIlwraith*	1861–1910	33 to 45 articles

An examination of the above statement clearly shews the great diversity in practice which existed in the selection of commodities in order to obtain the price data for the computation of Index-numbers. It may be seen that not one of the 67 commodities specified is common to all the Index-numbers. Several commodities in ordinary use, such as coal, iron, cotton, wool, wheat, butter, etc., etc., are, however, common to the majority of the groups.

Applying the principles which have already been laid down in this Appendix for the selection of a group of commodities for the purpose of international comparisons the following list has been compiled. Suggested "mass-units" (indicating relative consumption of each commodity in the corresponding unit of measurement) are also shewn in the following statement. These "mass-units" are based almost entirely on the Australian consumption, and are therefore suggested tentatively; they will probably require some amendment for international purposes.

Proposed List of Commodities Suitable for Comparative Index-Numbers for the Western Nations with Mass Units.

Commodities.	Unit of Measurement.	Mass-unit.	Commodities.	Unit of Measurement.	Mass-unit.
GROUP I.			GROUP V.		
METALS AND COAL.			GROCERIES, ETC.		
Copper	ton	1	Cocoa Beans	lb.	100
Iron, Pig	ton	28	Coffee Beans	lb.	200
Lead, Pig	ton	1	Currants	lb.	1,400
Silver, Bars	oz	20,000	Flour (Wheat)	ton	48
Tin, Block	ton	$\frac{1}{4}$	Flour (Rye)	ton	10
Zinc	ton	1	Hops	lb.	120
Coal	ton	600	Malt	cwt.	10
			Pepper	lb.	80
GROUP II.			Raisins	lb.	1,400
TEXTILES, LEATHER, ETC.			Sago	lb.	800
			Salt	ton	8
Hides	each	120	Sugar	ton	22
Sheep Skins	each	400	Tea	lb.	3,000
Cotton, Raw	lb.	24,000	Tobacco	lb.	1,300
Flax	cwt.	18	Candles	lb.	1,600
Hemp	cwt.	18	Mustard	lb.	72
Jute	cwt.	40	Kerosene	gallon	1,700
Silk	lb.	250			
Wool	lb.	12,200	GROUP VI		
			MEAT, ETC.		
			Beef	lb.	39,000
GROUP III.			Veal	lb.	2,000
AGRICULTURAL PRODUCE.			Mutton	lb.	33,000
			Pork	lb.	3,700
Barley	bushel	250	Fish	lb.	2,400
Beans	bushel	50	Lard	lb.	200
Hay	ton	270	Tallow	cwt.	35
Maize	bushel	1,000			
Oats	bushel	1,300	GROUP VII.		
Peas	bushel	55	BUILDING MATERIALS		
Rice	ton	2	Bricks	per 1,000	50
Rye	bushel	100	Timber	100 s. ft.	350
Straw	ton	25	Cement	cask	30
Wheat	bushel	500	Lime	ton	10
Potatoes	ton	40	Slates	per 1,000	$\frac{1}{2}$
GROUP IV.			GROUP VIII.		
DAIRY PRODUCE			MISCELLANEOUS.		
Bacon	lb.	3,200	Caoutchouc (Raw Rubber)	cwt.	50
Butter	lb.	9,500	Soda Carbonate	ton	$\frac{1}{2}$
Cheese	lb.	1,500	Saltpetre	ton	$\frac{2}{11}$
Eggs	doz.	1,800	Sulphur	ton	$\frac{1}{4}$
Milk	quart	30,000	Cream of Tartar	lb.	400
Honey	lb.	600			

Summary of Conclusions.—The conclusion of the whole matter divides itself into two heads, viz., (i.) that which concerns the list of commodities, the number of units to be taken, and changes in this list; and (ii). that which concerns the technique of computing the price-index.

Regarding the first we may say as follows, viz.:—

I. (i.) The list should contain (*a*) commodities easily identifiable as to character and quality; (*b*) commodities for which there are world markets. Commodities for which only a local market exists should constitute a separate list for local purposes.

(ii.) The number of units taken should represent the average usage among all the nations included in the comparison.

(iii.) The number of commodities and the units assigned should be subject to decennial revision.

(iv.) During each decennium, the series of units and commodities used must necessarily be those ascertained for the preceding decennium.

(v.) At the close of each decennium it is desirable that the price-indexes found for it should be revised on the introduction of the next decennial list of commodities, and the units of usage assigned to them.

(vi.) In order that the price-indexes, while substantially accurate from the standpoint of gold exchange-value, shall yet represent the actual usage of mankind in respect to commodities, its basis, owing to change of normal regimen, should be subject to continuous modifications.

(vii.) This is practically secured by varying the regimen units of commodities yearly one-tenth of the decennial difference, the *control* of the number of units assigned being properly attended to.

(viii.) Subdivisions of the list of commodities should be so made that the items within a subdivision are homogeneous with respect to the ratio of the value of the raw material to the value of the labour in the finished product.

(ix.) There can be no really perfect continuity between the price-indexes for periods characterised by different regimens.

(x.) Since economic inquiries of an exact character must take account of variations in the relative usage of commodities, comparisons between widely different periods must take account not only of variations in the exchange-value of gold, but also in average regimen.

In regard to technique, the common-sense method of adopting, for the purposes of comparison, a series of units of definite commodities and finding the aggregate of expenditure according to these, is unquestionably the best method of tracing the variations in the exchange-value of gold against commodities. The matter may be summed up as follows:—

II. (i.) For initial comparisons, the experience of each decennium will furnish the units that are used for the following decenniums.

(ii.) The method of finding the ratio of aggregate expenditures is not only the simplest but the best.

(iii.) Price-ratios are not satisfactory unless the weighted geometric mean be found, and using for the weights assigned the mean expenditure for any two periods. The method then becomes sensibly identical with the aggregate expenditure method, but the arithmetical work involved is prohibitive, and the method is not suited for continuous records.

(iv.) Although the apparent generality of the price-ratio method is not wholly an illusion, it practically has no advantages whatever over the aggregate of expenditure method, the latter being arithmetically very simple.

(v.) With the aggregate of expenditure method, the influence of any uncertainty in the series of commodities or in their prices, on the price-index deduced, can more readily be seen than with the price-ratio method.

(vi.) The establishment of an international series of commodities would have for its immediate object the comparison of the exchange-value of the gold-unit in each nation on the basis of a common average regimen.

(vii.) This may not be the best system of units for the nation itself.

(viii.) Each nation may find it necessary, therefore, to have also its own list, and its own units, and to deduce price-indexes representing the variation of the exchange-value of gold so far as the nation itself is concerned in its internal relations.

(ix.) In general the fluctuations on the two bases will not be quite identical, the difference being due to what may be called change of regimen.

(x.) Experience may, however, shew that the relation between the two can be readily determined, or is a negligible quantity, so that ultimately one list may suffice.

Regarding general matters the following may be said :—

III. (i.) It may, on first consideration, appear *unsatisfactory* that through long intervals of time the same class of commodities cannot be utilised for determining absolutely variations in the exchange-value of gold. If, however, the method involving slow variations of regimen be followed, there is no strong objection to the method indicated in this paper.

(ii.) *Per contra*, it is to be *preferred*, since it applies to the existing regimen at all points of time, at least when corrected as indicated by continuously varying the regimen.

(iii.) By these methods a satisfactory kind of *continuity can be secured*, which although only a pseudo-continuity as regards the exchange-value of gold, is nevertheless a real continuity as regards the usage of gold in relation to all other commodities on the list.

(iv.) It is therefore of much greater value than would be furnished by price-indexes based, if it were possible—which it is not—on a continued use of the commodities of the past as the basis of determination.

(v.) The method of a slowly changing "commodity unit," though establishing theoretically only approximate values, nevertheless yields results which more truly represent the aggregate of the facts, than does the method of absolute comparisons based upon the same number of units and the same list of commodities.

(vi.) Special investigations may nevertheless be considered necessary between any two years for any definite series of commodities, and any definite number of units in connection therewith.