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VARIORUM NOTES ON INDEX-NUMBERS

[In the following article, of which the original title was "Recent Writings on Index-numbers"—recent in 1894, in which year the article appeared in the *ECONOMIC JOURNAL*—the properties of this method of measurement are further considered. There appear some grounds for hoping that the labour-standard (above, p. 195) may prove not to diverge widely from the more commonly adopted consumption or commodity standard. The reconciliation would be important in the eyes of those who hesitate to follow the guidance of Professor Irving Fisher and other leaders who show the way to monetary stability, because it is uncertain what is the proper conception of monetary stability, towards which of two distinct destinations our movement should be directed.

In accordance with my general practice, I have suppressed some controversial paragraphs in this paper. But here, as throughout this Collection, the necessity of making clear my meaning has prevailed over my aversion to controversy.]

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One of the problems which has exercised economists for some years, the determination of variations in the value of the monetary standard, bears some not wholly accidental resemblances to one of the problems which has exercised philosophers in all ages, the determination of the standard of moral action. With respect to both problems there are wise men who despair of determinateness; there are enthusiasts, of whom each is confident that he has obtained *the* solution. With respect to both problems the discrepancy in principle is greater than the difference in practice.

These reflections are illustrated by Dr. Lindsay's recent volume; which is mentioned here only as typical of the sort of intolerance which—in monetary as in ethical theory—is apt to characterise common sense. It is not denied that the author has made good use of sound methods.<sup>1</sup>

<sup>1</sup> *Die Preisbewegung der Edelmetalle seit, 1850.* Jena: G. Fischer, 1893 (ch. iii. *et passim*).

The strife between rival methods may be somewhat abated by considering the second report of the United States Finance Committee upon the course of prices and wages; the results of which are summed up by Professor Taussig in a masterly paper read before the International Statistical Institute at Chicago.<sup>1</sup> There is hardly any difference between the index-numbers for the course of prices since 1860, as determined by a simple average, or by one weighted according to the importance of each article to the consumer—an importance which was measured by the proportions in which different articles entered into the average “budget” or expenditure of families of small means. Professor Taussig says: “If these two methods of simple arithmetical average on the one hand and average weighted by family budget importance on the other hand yielded greatly different results, we might be perplexed which to use as significant of the general course of prices.”

It must not be supposed that this sort of perplexity is always equally well avoided. There has lately been agitated a question of principle upon the answer to which depends a material difference in practice. Should the standard of deferred payments—the amount payable at future epochs to a creditor—be the product of a constant quantity of effort and sacrifice, the same “value” in Ricardo’s terminology,<sup>2</sup> or a constant quantity of commodity, the same amount of “riches”?

Professor Simon Newcomb<sup>3</sup> goes so far as to say—

“The fundamental idea on which the tabular standard [“twenty years ago supposed to afford a satisfactory solution to the problem”] was based, was that human labour itself furnished the best possible standard.”

In a similar spirit Mr. Leonard Courtney, in his candid article on Bimetallism, writes:—<sup>4</sup>

“We may aim not at a redelivery of article by article, but at a repayment of labour by labour or of sacrifice by sacrifice. . . . I do not stop to investigate the ethical foundation of this principle, which might lead us far afield; but I believe the standard so described does represent what would commonly be accepted as the *desideratum*.”

This standard derives some support from the argument

<sup>1</sup> Published in the *Yale Review* for November 1893.

<sup>2</sup> *Political Economy*, ch. xx.

<sup>3</sup> In his article in the September number of the *Journal of Political Economy*, Chicago, Vol. I. p. 505.

<sup>4</sup> In the *Nineteenth Century* for April 1893.

employed by Dr. L. S. Merriam in a recent article<sup>1</sup> that "the restoration of equal value or equal amounts of final utility"—a principle underlying approved standards—"means also the restoration of equal amounts of final disutility."<sup>2</sup>

Mr. E. A. Ross objects that as the goods restored would not all be employed at the margin of expenditure, the increase in the quantity of goods payable by the debtor should not be measured by the decrease in their *final* utility. This objection is valid against the exact correspondence between the labour standard and the utility standard which Dr. Merriam had suggested in virtue of the condition that final utility balances final disutility.<sup>3</sup> But Professor Ross does not disprove a rough correspondence between the utility standard as corrected by reference to total rather than final utility, and the disutility standard in the only form in which it is practically proposed to employ it—viz. assuming the total labour per head at the periods compared to be constant, and taking the ratio between the total quantity of goods produced per head now, and the corresponding total at a former epoch, as the measure of the increase in the quantity of goods produced by a unit of labour.<sup>4</sup> The depreciation of goods, if I may be allowed the expression, thus determined by the disutility standard may well coincide with—there is no reason why it should exceed—the depreciation determined by the (total) utility standard.

This possibility becomes fortified by the consideration that, as Mr. Ross well puts it, "the total well-being we derive from goods depends not only on the positive satisfaction experienced in use or consumption," but also "on the social satisfactions that flow to us in consequence, the latter largely determined by the relation of our consumption to that of our neighbours."<sup>5</sup> In a progressive state of society the second circumstance as well as the first tends to depreciate goods with respect to utility, and *pro tanto* increases the probability that the appreciation of money as measured by the corrected utility standard will not

<sup>1</sup> "The Standard of Deferred Payments." *Amer. Ac. Pol. Sci.*, January 1893. It is sad to learn that the promising author of this just and ingenious argument has been the victim of a boating accident.

<sup>2</sup> On the idea of the final utility of wealth decreasing with the progress of society see the first of the British Association Memoranda above referred to, H. p. 210.

<sup>3</sup> *Amer. Ac. Pol. Sci.*, November 1893.

<sup>4</sup> This argument may be illustrated by the use of diagrams such as Jevons has employed in his *Theory* to denote the total and final utility of consumption and disutility of production.

<sup>5</sup> *Loc. cit.*, p. 104.

be materially greater than as measured by the proposed labour standard.

One objection against the Labour standard recently made by Professor Foxwell does not seem to me decisive: namely that it is impossible to define "a unit of labour."<sup>1</sup> A similar objection might be made to the most generally received index-number based upon consumption; which seems to involve implicitly what Dr. Julius Lehr with his *genusseinheit* has the courage to state explicitly—the measurement of utility.

If the objection is directed, not so much against the difficulty of conceiving, as that of carrying out the labour standard; it may be replied that statistics of wages, which may be regarded as giving the average increase in the amount of money procured by a day's work,<sup>2</sup> are not altogether wanting. For example, Professor Taussig in the paper already referred to exhibits the rise of wages, as well as the fall of prices, during recent years. He remarks:—

"The average, or index-numbers, are in one sense more accurate and significant as to wages than they are as to prices.

"The inevitable fictitious quality of a general index-number thus calls for less constant allowance in using these results of the statistics of wages than in using the figures for prices."

An index-number based on such statistics is accurate enough for the conclusion to which it is applied: *quieta non movere*—that for the purpose of assuring to creditors the produce of a constant quantity of labour an alteration of the standard of deferred payment is not called for.

But this purpose may not be accepted as just and expedient by currency reformers whose end is to minimise the drag on the producer caused by continually shrinking prices.

For the construction of an index-number which should indicate that danger retail prices are less appropriate than wholesale prices. Accordingly when Mr. Cannan, criticising Bimetallism,<sup>3</sup> doubts the fact of appreciation as not evidenced by retail prices he is not persuasive. But the same consideration, with reference to the purpose of endowment—keeping a teacher or

<sup>1</sup> In speaking before Section F of the British Association 1893; as reported in the December number of the *Journal of the Statistical Society*, p. 645. *Cp.* Report of Annual Meeting of the Bi-metallic League, 1894, p. 56.

<sup>2</sup> The other element of effort-and-sacrifice, abstinence, is less easily taken account of. On an average, statistics relating to numerous different occupations, the errors due to the neglect of this element might disappear through compensation.

<sup>3</sup> *Economic Review* October 1893.

preacher on the same level of comfort and respectability—would be pertinent.

It is with the index-numbers as with conduct; in order to form a just judgment, we must always look to the underlying idea and purpose.

As another example of misunderstanding occasioned by diversities of purpose, I may refer to that variety of index-number which purports to determine a real quantity, a cause or characteristic, such as "scarcity of gold," in some more objective sense than a mere fall of prices on an average.<sup>1</sup> The *quæsitum* in this case may be likened to a physical quantity which is to be ascertained from a set of measurements. The method accordingly presents certain peculiarities derived from the theory of errors-of-observation.

I have been unfortunate in not making this view clear to Professor Laughlin. Some years ago<sup>2</sup> he had seemed to deny that there had occurred a general fall in prices in a sense which could prove the existence of "scarcity of gold." After accounting for the fall of prices in several species of commodity, he goes on:—

"The preceding discussion however does not account for a general fall in prices. If the fall of prices had been general, it might suggest a single cause affecting all commodities, such as the scarcity of the medium, by which goods are exchanged, in fact, it seems to be quite necessary to a theory which explains the fall in prices by the scarcity of gold that the fall should be universal."<sup>3</sup>

Referring to this passage and the similar views of other writers I maintained:—

"To assert with Mr. Laughlin and others that, in order to prove a general fall, you must prove a fall in every article, is wholly to ignore the character of the investigation. . . .

"The phenomenon under examination is of the nature of what Mill called a 'residual phenomenon,' like the difference in the mean height of the barometer between two hours of the day, the so-called 'diurnal variation.' On an average of many days there is found to be a fall, but it is not necessary nor true that every day's experience should present that phenomenon. The theory of probabilities is satisfied with a 'majority of days.' . . .

<sup>1</sup> See first Memorandum, Section IX; third Memorandum, Section VI.

<sup>2</sup> In his paper on "Gold and Prices since 1873," in the *Quarterly Journal of Economics* for April 1887.

<sup>3</sup> *Loc. cit.* p. 340.

"It seems to be taken for granted that, when we can show a reason why each price should have varied in the direction actually observed, we are thereby debarred from inferring a general displacement due, in the phrase of Mill, to 'causes that operate on all goods whatever.' But this assumption is quite erroneous. The meteorologist may be able to assign the reason why between morning and noon each particular day there has been a rise or fall of the barometer. But the mathematician is not thereby precluded from extricating by the theory of probabilities a mean variation between those hours."<sup>1</sup>

Referring last year to this criticism Professor Laughlin complains that I have "wholly misunderstood" his argument.<sup>2</sup>

I am very sorry to have unconsciously misrepresented the argument which I was disputing. I can only console myself by reflecting that no amount of care on my part could have averted the mistake, since even after Professor Laughlin's explanation I am unable to discern any appreciable difference between the position which he takes up and that which was the object of my attack. He explains:—

"I at least never contended that 'in order to prove a general fall you must prove a fall in every article.' Accepting the fact of a decline in prices, my contention was solely that the *cause* of the decline could not be scarcity of gold; since, if there was a single cause for the fall then this cause should show itself in all,<sup>3</sup> or nearly all, the commodities quoted."<sup>4</sup>

Now my contention was and is that, though there be a common cause it need *not* "show itself in all or nearly all the commodities quoted."

To take a new example, for which the data happen to be ready to hand: suppose that the average height of a regiment of 1000 Italian recruits selected indiscriminately from all the provinces was returned as half an inch in excess of the average height of the whole army; one might infer with certainty that the difference was due to a real cause (as distinguished from chance); and that cause might well be "single," such as the circumstance that the men in the regiment were (contrary to the general practice) measured with their shoes on. But it does not follow

<sup>1</sup> *Quarterly Journal*, Vol. III (1889) p. 107.

<sup>2</sup> *Journal of Political Economy* (Chicago), Vol. II., p. 279.

<sup>3</sup> His former words (above quoted) are "it is quite necessary . . . that the fall should be universal"; excusing, I think, my expression "a fall in every article." But I am quite willing to substitute "all or nearly all" for "every."

<sup>4</sup> *Loc. cit.*

that this cause should show itself—by excess above the average of the kingdom—in a large majority. The proportion of men above the general average might be about 57 per cent., 570 out of the 1000.\* Is that “all, or nearly all”?

\* Say the standard deviation for the national stature is 2·6 inches (Yule, *Theory of Statistics*). The coefficient for the mean height of the regiment would be ·08; less than a *sixth* part of the observed difference! If  $h$  is the average height of the army,  $h + \cdot 5$  that of the regiment, the proportion of the regiment above  $h$  would be about 57 per cent. (2·6 being the S.D.).