NOTES AND MEMORANDA

Measurement of Inequality of Incomes

I HAVE read with the greatest interest the article by Mr. Hugh Dalton ("The Measurement of the Inequality of Incomes ") which appeared in the September number of this JOURNAL, and I admire the simplicity and ease of the method which he suggests for measuring the inequality of economic welfare, on the hypothesis that the economic welfare of different persons is additive. The methods of Italian writers, which are explained by Mr. Dalton, are not, as a matter of fact, comparable to his own, inasmuch as their purpose is to estimate, not the inequality of economic welfare, but the inequality of incomes and wealth, independently of all hypotheses as to the functional relations between these quantities and economic welfare or as to the additive character of the economic welfare of individuals. The same methods are, on the other hand, applicable not only to incomes and wealth, but to all other quantitative characteristics (economic, demographic, anatomical or physiological), and they have, in fact, been actually employed to obtain a rough estimate of the various degrees of inequality which the distribution of these characteristics presents.

Mr. Dalton explains these methods with precision and brevity, and Italian writers must be most grateful to him for having directed the attention of English economists to the subject. Perhaps, however—as a supplement to Mr. Dalton's article—I may be permitted to draw the attention of readers of the ECONOMIC JOURNAL to certain papers, a perusal of which, in my opinion, is necessary to enable one to form an exact idea of the applicability and character of the methods in question. These are : E. Czuber, "Beitrag zur Theorie statistischer Reihen," in *Versicherungs-wissenschaftlichen Mitteilungen*, Neue Folge, Vol. IX., p. 101 *et seq.*, Vienna, 1914 ; C. Gini, "Sulla misura della concentrazione e della variabilità dei caratteri," in the *Transactions of the Real Istituto Veneto di Scienze, Lettere ed Arti*, Vol. LIII., Part ii., p. 1203 *et seq.*, Venice, 1914 ; G. Pietra, "Delle relazioni tra gli indici di variabilità," in the *Transactions of the Real Istituto Veneto di Scienze, Lettere ed Arti*, Vol. LIV., Part ii., Venice, 1915 ; Paper I., p. 775 *et seq.* ; Paper II., p. 793 *et seq.* Probably these papers have escaped Mr. Dalton's attention owing to the difficulty of access to the publications in which they appeared.

Mr. Dalton rightly attaches importance to the degree of laboriousness of the various methods, and to their applicability to such imperfect statistics of income as we possess. It may perhaps be noted here that Professor Czuber has suggested (p. 126 *et seq.*) and has worked out a procedure for the calculation of the mean difference which is simpler than the one I used in *Variabilità e Mutabilità* (compare also on this question Pietra, "Sulla teoria della variabilità nelle serie statistiche," in the *Rivista Italiana di Sociologia*, May–August, 1915, p. 417); and, if I am not mistaken, a still more rapid procedure is described in my paper, "Sulla misura della concentrazione" (p. 1210 *et seq.*). In this paper, moreover, the calculation of the mean difference in the case of imperfect statistics [1] is examined in detail, and suitable correction coefficients are given (pp. 1211–1223). On the other hand, the calculation of the mean difference can often be made advantageously, in the case of very imperfect statistics, by a graphical method based on the area (area of concentration) contained by the curve of concentration and the line of equal distribution. Many subsequent applications of this procedure have convinced me of its great practical utility.

In this same paper (pp. 1237–1238) the relation between the mean difference and the area of concentration (to which Mr. Dalton alludes on p. 354) is established, and also the relation (to which Mr. Dalton refers on p. 360) between the mean difference and the reciprocal of Pareto's α when the distribution follows Pareto's curve is given (p. 1244; *cf.* also on this point, *Variabilità e Mutabilità*, pp. 60–63). From these relations, it is easy to corroborate the further relations between our δ and the area of concentration which Mr. Dalton establishes on p. 360.

I should like, therefore, to direct the attention of readers of the ECONOMIC JOURNAL more particularly to the two excellent papers of Dr. Pietra. In the first of these the relations are brought to light which exist between the mean deviation from the arithmetic mean, the mean deviation from the median, and the area of concentration. [2]

In the second paper the ranges of variation of the relative

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[1] In my article I am really concerned with the determination not of the mean difference but of the *concentration ratio*, which is the quotient of the mean difference by twice the arithmetic mean; but what we say of one will apply equally to the other.

[2] *N.B.*—On pp. 784–786, the proof that distributions having a concentration curve, to which a parallel to the line of equal distribution is tangential, have all the same relative mean deviation. This proof Mr. Dalton, on p. 354, mistakenly attributes to Ricci. Dr. Pietra had already called attention to the possibility of such a confusion. Compare "Recenti Pubblicazioni di Metodologia Statistica," in the *Rivista Italiana di Sociologia*, March-June, 1917, pp. 312–317.

mean difference, of the relative mean deviation from the arithmetic mean, of the relative mean deviation from the median, and of the relative standard deviation are established, the causes of discrepancy between these various indices of variability are examined, and the limits are fixed within which these discrepancies can be verified.

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SOUTH AFRICAN CURRENCY

PROFESSOR CANNAN, in his article on "South African Currency" in No. 120 of this JOURNAL, does not, perhaps, do full justice to some of the provisions of the recent Act setting up the new South African Reserve Bank. This Act (the South African Currency and Banking Act, 1920) is closely modelled on the Federal Reserve Act of U.S.A. in all those of its provisions which are designed to be permanent. In so far as the rather chaotic condition of banking in South Africa resembled that of U.S.A. before November, 1914, it must be admitted that the drafters of the new Act were well advised in the system they selected for imitation. In any case, the establishment of a central bank with functions of a nature quite distinct from those of an ordinary commercial bank is an event deserving of more than passing notice, and students of banking would have been interested to have had Professor Cannan's comments thereon.

It is not correct to say, as Professor Cannan does, that the new Reserve Bank has "power to issue unlimited bank-notes against 40 per cent. of gold." As backing for its note issue it is required to maintain a reserve of *not less* than 40 per cent. in gold with the balance in approved bills of exchange. In addition to the reserves needed against the note issue, it must hold in gold a reserve of not less than 40 per cent. of its deposits and other liabilities to the public. These provisions, coupled with the graduated tax imposed on excess circulation in the event of the suspension of the requirements as regards the gold ratio, seem sufficiently drastic to prevent any danger of over-issue. Moreover, if the good example of the Federal Reserve Banks in maintaining reserves far above the minimum required by law is followed, there will be an additional protection. With an ex-Chief Accountant of the Bank of England as Governor, it is probable that the new bank will make every effort to maintain its issue on an unexceptional basis.