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GLEANINGS *from the* CENSUS of PRODUCTION REPORT.

*By* A. W. FLUX, M.A.

[Read before the Royal Statistical Society, April 15, 1913,  
Mr. R. H. REW, C.B., Vice-President, in the Chair.]

IT is now rather more than six years since Mr. Yule presented to the Society his Paper on "Statistics of Production and the Census of Production Act, 1906," in which he examined the provisions of the addition then recently made to the Statute Book, and the difficulties which were likely to be encountered in its administration. That Paper and the discussion on it may be said to have surveyed the channel which the new Census of Production Office was to navigate and to have established warning beacons at some rocky headlands, and buoys where dangerous shoals were to be encountered. The journey through the channel has now been once completed, and it is fitting that the Society should be asked to consider the results attained, even though the very common view be endorsed that the greatest gain to be derived from the new information as to our national production will accrue as the survey is repeated at recurring intervals. The selection of a quinquennial interval, as determined by the Order of the Board of Trade of October 28, 1911, is in accordance with the general opinion expressed on the occasion of the reading of Mr. Yule's Paper in February, 1907.

It is by no means necessary, however, to await the results of the new Census, to cover the year 1912, or of future Censuses, in order to secure information of importance from the data now available, and I propose to indicate some of the ways in which it is possible to utilise the present material, developing, so far as the time at my disposal will permit, certain points touched in the General Report prefixed to the recently issued blue-book [Cd. 6320], which contains the revised and completed census data.

I may be allowed to give a word in passing to the relation between the Preliminary Tables, in which the more important data were made available to the public as soon as they could be prepared for publication, and the Final Report with its revised Tables. Certain comparisons, between the data published in these two series of tables, have been made to suggest that the preliminary data were in some cases extraordinarily incomplete and misleading. This is a mistake which arises in the main from a failure to observe that, in the earlier parts of the Preliminary Tables, the figures included related in general to factories only, while the completed figures of the Final Report include information relating to workshops as well. In a few cases the trade aggregates are made up of figures for factories and workshops in such proportions that neither set by itself affords a satisfactory indication of the extent of the operations included in the trade as a whole. As soon as the compilation of the workshop data could be carried to a sufficiently complete stage for inclusion in the Preliminary Tables as they were published, any difficulty arising from this source was overcome, and the variations in trade-aggregates as first published and as they appear in the Final Report are relatively slight after that course was available. The preliminary figures which appeared latest, too, had the advantage of having undergone the process of revision rendered possible by the progress of correspondence with the firms making Returns. This correspondence was necessarily a tedious and relatively slow business. In a newly organised office there are no traditions to guide subordinate members of the staff, and many points have to await the decision of the responsible heads of the office, which, when once decided in principle, involve a greatly diminished expenditure of time in their application. This fairly obvious fact—and its necessary consequences—should not be lost sight of. The early issues of the Preliminary Tables, therefore, covered trades the results for which were considered to be of greatest general interest, and this necessitated a grouping which was not in some respects that arising naturally from the affiliation between different trades. In the Final Report the original grouping has consequently undergone revision, and those trades are dealt with together which have natural connections, as far as that principle admits of application under the circumstances.

The Final Report also contains information on various subjects, such as coal consumption, engine-power available, &c., not included in the matters dealt with in the Preliminary Tables. The completion of the tabulation for all trades, further, rendered available the whole of the data relating to the output of various classes of goods, not merely the data relating to their production in the trades in which they are a principal line of output. It was, therefore,

possible to survey the field as a whole, and to bring together such scattered information.

In the discussion by this Society in 1907, the subject of duplication of recorded output took a place of great prominence, and rightly so. The different stages of manufacture at which sometimes one and the same mass of material is handled may be united under a single control, and returned as a unit, or they may be conducted independently, so that the material contributes repeatedly to the aggregate of recorded output. The raw cotton, from which cotton yarn is made, contributes its quota to the value of that yarn, and thus to the material of the weaver, and yet again, as an element in the woven fabric, to the material purchased and used by makers of cotton garments. In each case the articles produced are properly regarded as the physical product of the manufacturer who turns them out, and their value constitutes his value output. But their gross value does not constitute his value product, which consists only of the addition made, in the process of manufacture, to the materials on which that stage of the manufacturing operations is conducted. The value output may be large or small according as the work is conducted on materials of high or of low value, and can be increased or decreased by modifications of the commercial relations between businesses without any change in the nature or efficiency of the technical processes of manufacture. In such an industry as coal-mining, the value product is a very large proportion—over 86 per cent.—of the value output. In such a case as grain-milling, the value output is over ten times the value product, while in the refining of the precious metals the value output is over one hundred times the value product. Comparisons of the figures of gross output, added together for miscellaneous groups of trades, may consequently convey little real information as to the relative position at different times, or the comparative industrial situation in different countries.

It may be added, for completeness, that what has been referred to above as the value product is not the whole of the amount by which the value of goods made exceeds the value of materials used. Part of the value of the machinery used in the productive work, as well as the value of the materials as they are commonly regarded, is really reproduced in the value of the product. It is not possible to make a satisfactory allowance, trade by trade, or firm by firm, for such depreciation of plant, and the difference between the value of the products of manufacture and the value of the materials used up in making those products is treated as the amount of new value created in the manufacturing process. An attempt is made in the General Report, to which I shall refer later, to estimate roughly, for

the aggregate of all industries in the United Kingdom, the approximate amount of this item of depreciation.

It appears that the aggregate of the gross figures of output of the different firms making returns amounted to 1,765 million £, while the sum of the additions to value made at the different stages of production was 712 million £. For the latter the term "net output" is used in the Report. This term has been used by some writers to cover the value of output after eliminating all duplication between different Returns, or what is called the "net value of products" in United States Census Reports. An attempt to express in money the corresponding total for the United Kingdom in 1907 is made in the General Report, and the total arrived at is given as lying between the limits of 1,241 and 1,256 million £, exclusive of duties, or (say) 1,280 to 1,295 million £, inclusive of such duties as are comprised in the total of 1,765 million £ quoted above. (Duties on home-distilled spirits are not included in the total output of the distilleries.) It would appear, therefore, that the figures of total output include duplication to the extent of 470 to 485 million £. The duplication of goods accounts for most of this, while the addition to the value of the duplicated goods between the works at which they are recorded as output and those at which they are recorded as materials for a further process of production makes up the total. The duplication of goods, therefore, may be estimated at about 25 per cent. of the total value of output recorded.

There would be a good deal of convenience, from the practical standpoint, if the value of goods free of duplication could be used to represent the results obtained in each industry. It is not, however, possible to estimate in some industries with sufficient precision the extent of duplication, though for the aggregate of all industries a reasonable approximation has been possible. Much of the discussion which follows is therefore based on the "net output" in the sense in which this term is used in the Report. This has the advantage of dealing with those accretions of value which occur in the course of the productive processes and may therefore be correlated with the numbers engaged in carrying through those processes.

Before touching this part of my subject, however, it is desirable to refer to the inclusion in the Returns of figures compiled on two different bases. The great majority of the Returns give the values of products as disposed of, inclusive of the profit (or taking into account loss) made by the producers. The Returns of Government Departments, Local Government Authorities, Railway, Tramway, Canal, Harbour, Dock, &c., Companies, and the National Telephone Company are, however, based on cost of production, without profit.

In the commercial concerns, the profit, if any, made by the manufacturing departments is, practically, left to be credited to the other operations of the Companies concerned. In the case of the manufacturing activities of Government departments, national or local, the profit, if any, accrues in the shape of smaller tax levies than would otherwise be necessary. The aggregate value of the output thus entered at cost was 71·6 million £, the "net output" being 35·7 million £, and the numbers employed averaged 505,376. To complete the record on a uniform basis, some item equivalent to profit in respect of the work of this half-million people should be added to the record of "net output." The amount of the item is, however, speculative to a rather high degree. The much-debated question of the efficiency of the organisation of government manufacturing operations is involved in about one-half of the "net output" of the 505,376 workpeople concerned. If it is to be assumed that, selling the goods produced in the competitive market, a value could have been secured much higher than the recorded cost, then it would be proper to add the equivalent to the "net output" total. Though the absence of knowledge prevents the inclusion of such "hypothetical" profit in the tabular totals, it may be as well to remember the point, while the "net output" might perhaps be raised to between 720 and 725 million £, to give a rough indication of the possible effect of the presumed omission, in place of the recorded 712 million £.

There is a remarkable range in the average figure given by dividing the net output for any industry by the numbers engaged in that industry. This figure would appear to be so significant that I propose to devote a large part of this paper to developing the indications of the General Report as to the causes of the contrasts shown, so far as the data contained in the Report may serve to throw light on the problem when the details are more closely examined.

It would be more satisfactory, for the purpose which I have now in hand, if the average net output were classified, not trade by trade, but establishment by establishment. Information of this character is not, however, available, and it remains to be determined whether it would throw enough light on matters which it is desirable to know to justify the expense involved in making the tabulations. The examination of the available material made below may elucidate this point. I have, therefore, arranged the various separately grouped trades in the order of their average net output per head (*see* Appendix), and the following table summarises the results :—

*Net output and persons employed classified.*

Average net output per head in the trade.	Including all returns.		Excluding non-profit returns.	
	Net output. £000.	Number employed.	Net output. £000.	Number employed.
Under 50 <i>l.</i> .....	1,915,	59,591	955,	32,613
50 <i>l.</i> and under 75 <i>l.</i> ....	127,269,	1,938,203	97,166,	1,508,327
75 <i>l.</i> „ 100 <i>l.</i> .....	185,998,	2,192,288	181,428,	2,144,236
100 <i>l.</i> „ 125 <i>l.</i> .....	148,855,	1,353,491	148,855,	1,353,491
125 <i>l.</i> „ 150 <i>l.</i> .....	116,564,	915,761	116,495,	915,291
150 <i>l.</i> „ 175 <i>l.</i> .....	18,128,	115,465	18,128,	115,465
175 <i>l.</i> „ 200 <i>l.</i> .....	30,564,	164,830	30,564,	164,830
200 <i>l.</i> and over .....	82,842,	244,541	82,842,	244,541
Total .....	712,135,	6,984,170	676,433,	6,478,794

The position of various trades in the table is influenced by the degree in which they were affected by the generally prosperous condition of business in 1907. In some cases an exceptional demand for their products has had the effect of raising the net output considerably above its normal level, while there are not wanting illustrations of depression below the normal level. This point may be borne in mind as supplementing and qualifying some of the comment in the succeeding paragraphs.

The distribution shown is affected by the fact that large industrial totals are treated as units, quite independently of variations which may occur between different localities or groups of establishments. Thus the fourth line of the table, the 100—125*l.* group, includes the Engineering Trades, with an average of 461,703 persons engaged, and the following line includes the Coal Mines, 838,586 persons being employed in and about those mines in 1907, on the average of the days for which returns were received.

Were it possible to break up the Engineering Trades into smaller groups there would probably be some scattering up and down the table of the figures which are massed together in the existing data. The same would hold good of Coal Mines, in view of the considerable variations in the value of the mineral in different localities, and of the number of tons produced per person employed. Other considerable aggregations also exist, the analysis of which would modify the indications of the table in some degree, but it is likely that, were the Iron and Steel Trades in the 100—125*l.* group, the Ship-building Trades, the Building Trades, and the Cotton Trade in the 75—100*l.* group, and the Woollen and Clothing Trades in the 50—75*l.* group broken into subordinate parts, the overlapping of the different processes of decentralisation would go a good way towards neutralizing the effects of all taken together. The material

for doing this is not available in the Report, and thus the experiment cannot be tried. From the data summarised in the table as given, however, we see that, taking the Returns made on a profit basis alone, of the 6,478,794 people engaged in the trades covered by the table, 3,685,176 were engaged in trades in which the average net output per head was below 100*l.*, while 2,793,618 were engaged in trades with a net output over that limit, the average net output per head being about 104*l.* The omission of the non-profit Returns thus raises the average to almost exactly 2*l.* per week per person, the average for the non-profit Returns being barely 71*l.* per head, or under 27*s.* 6*d.* per week per person employed. The median of the Returns on a profit basis is under 90*l.* per head, while the mode appears to be yet lower and might quite probably be in the neighbourhood of 80*l.* if the distribution of the large aggregates above referred to were carried out. It is clear that, in spite of the average net output of 2*l.* per week per head, one-fourth of the persons engaged are in industries not yielding as much as 30*s.* per week per head to meet all the establishment and capital charges, including repairs and depreciation, as well as to provide wages for the employees, interest for the owners of the capital and profits for those who have shouldered the risks of the enterprise.

The two extremities of the table will probably attract most attention. The lower end is readily disposed of. Reference to the detailed tables attached to this paper will show that the group with the lowest net output per head is made up of the Flax Scutching, Fish Curing, and Velvet and Fustian Cutting Trades. In each of the first two of these the work is seasonal, and the figures do not therefore reflect the result of a full year's efforts of those engaged.

At the upper end we have a considerable number of trades the net output for which appears to stand apart from the general grouping revealed by the table. The numbers in the last three groups are rather over half a million, the net output about 130 million *£*. The general level of the net output of this half-million persons is thus  $2\frac{1}{2}$  times as high as the average of the remainder. What are the industries which contrast so strongly with the general conditions?

Taking first the cases in which the net output was recorded as over 200*l.* per head, we find that the group includes the gas, water and electricity undertakings, with 128,161 persons engaged and nearly 32 million *£* of net output recorded. As is shown in the Report, the outstanding capital of these undertakings was, roundly, 350 million *£*. It is easy, therefore, to understand why so large a net output is needed, since, after even a very modest allowance for maintenance, renewal and interest, the balance will be of an order of



magnitude similar to that of the general run of industries. The large capital is, in these cases, needed not for manufacturing purposes only but for the distribution of the product, so that the strictly manufacturing operations, if they could be separated from those connected with distribution, might not present a net output calling for special comment.

Brewing, spirit distilling, and rectifying and compounding of spirits are also included in this group, and, even after making due allowance for the fact that the figure for the first of these is inclusive of duties on the product, the net output per head is very high in all three cases. The necessity for meeting out of the value of the goods as returned considerable charges connected with distribution may probably be a principal cause for the apparent large net output of manufacture. The same general consideration probably accounts for the place of the Ink, Gum and Sealing Wax trades in this group.

Coke works and Shale Oil works also appear in the group, and with regard to these it is probable that the net output of the works in question includes part of what might reasonably be assigned to the Coal and Oil Shale mines, the products of which have been charged at cost in some cases to the works now in question.

The Sugar and Glucose trades also fall within the group, but the deduction of duties would throw them into the group next but one lower. Even so, the net output ranks high. The manufacture of Ice is the only remaining trade yielding a net output of over 200*l.* per head.

The trades with a net output averaging from 150*l.* to 200*l.* per head include almost all those grouped in the Report as Chemical and Allied Trades. The manufacture of cattle, dog and poultry foods has something in common with these trades, and also with grain-milling, the net output for which averages high, 178*l.* per head. The group of trades engaged in the manufacture of farinaceous preparations and household articles for cleansing and polishing (except soap) is another member of the group under consideration, which also includes the manufacture of tobacco and the bottling of liquors. The printing and publishing trades fall into the group in part because the number with which the output is compared does not include the writers not on the permanent staff of the newspapers and magazines from the selling value of which must nevertheless be provided the remuneration of these writers. The true net output per head cannot be ascertained, but it would doubtless be considerably lower than the average of 190*l.* recorded. The special value attaching in some cases to the advertising space in newspapers and magazines helps, however, to keep the figure high.

The enumeration of the trades in the group is completed with the mention of manufactured fuel production, iron-mining, and the refining of the precious metals. Reasons already named in reference to coke works may suffice to explain the presence of the former in the group, while possibly the inclusion of royalties in the charges to be met from net output suffices to account for the second. I shall not attempt to explain in detail every case, but leave them for consideration by those familiar with the conditions of the several trades. My main purpose has been to examine generally the somewhat anomalous tail of the table, so as to clear the way for some further analysis of its main body. To this I now proceed.

It has appeared that in certain cases a heavy burden of capital necessitated a large net output per head in the industries concerned. To some small extent the generality of the operation of this influence may be tested by examining separately the output in establishments where mechanical power is used and those where no such power is employed. The next table makes this analysis, the Returns on a non-profit basis being excluded.

*Net output in factories and workshops compared.*

(a.) *Classification by net output in trades as a whole.*

Average net output per head in the trade.	Establishments using power.		Workshops (not using power).	
	Net output. £000.	Number employed.	Net output. £000.	Number employed.
Under 50 <i>l.</i> .. .. .	209,	7,244	745,	25,369
50 <i>l.</i> and under 75 <i>l.</i> ....	73,517,	1,132,268	23,649,	376,059
75 <i>l.</i> „ 100 <i>l.</i> ...	152,541,	1,763,053	28,887,	381,183
100 <i>l.</i> „ 125 <i>l.</i> ....	140,064,	1,248,110	8,791,	105,381
125 <i>l.</i> „ 150 <i>l.</i> ....	115,689,	905,248	806,	10,043
150 <i>l.</i> „ 175 <i>l.</i> ....	17,124,	104,912	1,005,	10,553
175 <i>l.</i> „ 200 <i>l.</i> ....	29,726,	160,586	838,	4,244
200 <i>l.</i> and over .....	79,933,	232,661	2,909,	11,880
Total .....	608,803,	5,554,082	67,630,	924,712

It is obvious that the workshop output per head falls below that of the factory, taken in the mass, and a rearrangement of details is necessary so as to bring together the trades which have outputs of like magnitude per head in factories taken by themselves and in workshops taken by themselves. The next table effects this.

(b.) *Classification by net output of factories and workshops separately.*

Average net output per head.	Establishments using power.		Workshops (not using power).	
	Net output. £000.	Number employed.	Net output. £000.	Number employed.
Under 50 <i>l.</i> .....	209,	7,244	2,540,	68,676
50 <i>l.</i> and under 75 <i>l.</i> ....	69,431,	1,080,716	29,504,	449,194
75 <i>l.</i> „ 100 <i>l.</i> .....	156,343,	1,811,932	28,968,	365,472
100 <i>l.</i> „ 125 <i>l.</i> .....	137,989,	1,232,267	2,466,	22,336
125 <i>l.</i> „ 150 <i>l.</i> .....	116,309,	912,566	481,	3,600
150 <i>l.</i> „ 175 <i>l.</i> .....	16,916,	104,996	282,	1,875
175 <i>l.</i> „ 200 <i>l.</i> .....	31,673,	171,700	44,	242
200 <i>l.</i> and over .....	79,933,	232,661	3,345,	13,317
Total .....	608,803,	5,554,082	67,630,	924,712

The change of basis of classification brings about some concentration of the figures in both parts of the table. The two groups showing large numbers employed in workshops are dominated by the clothing and building trades respectively, and little comment is called for by the distribution of the remaining workshop employees over the table. The movements by which this second table is derived from the preceding one, however, bring to light some apparent anomalies. In general the output per head averages considerably less where no mechanical power is used to assist the human agents in production than in those in which power is more or less generously provided, as is clear from the summary of the table, which shows an average output of 73*l.* per head in the former, compared with nearly 110*l.* in the latter, or, excluding the last three groups of the table, 70*l.* as against 95*l.* The reversal of this relation of inferiority, which is shown in the cases of the clothing trades (65*l.* as against 58*l.*) and in some other instances is sometimes to be attributed to the fact that there are relatively important numbers of outworkers associated with the workshops, while the output per head is calculated with reference to those only who are employed in the workshops, while in other cases the workshops are engaged on special work yielding a larger return than the class of work done in the factories. The chemical trades illustrate the latter situation, the average workshop net output being 219*l.* per head, that of the factories 181*l.*

Though the separation of workshop and factory figures affords some indication of the influence of the charges involved by the maintenance of elaborate machinery, driven by engines whose expenses, other than the cost of fuel, have to be met equally with those of the manual workers from the net output, the variation of net output in factories in different trades remains a striking phenomenon. A different kind of

analysis of the data is needed to bring out the dominant element in the variation shown. For this purpose a table is next shown in which the information for all establishments, factories and work-shops together, for which the Returns were made on a profit basis, is arranged so as to show the classification of workers by sex and by the broad age division which separates adults from adolescents. In the Mining groups, the division is usually made at 16 years of age, but in all other trades at 18 years. This consideration vitiates the totals to some extent, but not sufficiently to render them useless or misleading for our purpose.

*Classification of persons employed, by sex and age.*

Average net output per head in the trade.	Males.		Females.	
	Boys.	Men.	Girls.	Women.
Under 50l. ....	901	9,481	1,385	20,846
50l. and under 75l. ....	90,789	511,915	207,548	698,075
75l. „ 100l. ....	215,205	1,337,898	159,627	431,506
100l. „ 125l. ....	165,239	1,055,742	32,742	99,768
125l. „ 150l. ....	65,431	831,132	3,392	15,336
150l. „ 175l. ....	9,854	65,092	13,240	27,279
175l. „ 200l. ....	13,018	138,635	3,038	10,139
200l. and over .....	10,172	230,963	366	3,040
Total .....	570,609	4,180,858	421,338	1,305,989

The relative predominance of female labour in the trades showing the smaller figures of net output is clearly manifest from this grouping of the data. Expressed in percentages we have the following statement, in which is included further information for use shortly :—

Average net output per head.	Males per cent. of all employed.	Females per cent. of all employed.	Horse power of engines at factories per 100 employed	
			In all establishments.	In factories.
Under 50l. ....	31.9	68.1	21	92
50l. and under 75l. ....	40.0	60.0	50	67
75l. „ 100l. ....	72.4	27.6	97	118
100l. „ 125l. ....	90.2	9.8	100	189
125l. „ 150l. ....	98.0	2.0	266	269
150l. „ 175l. ....	64.0	36.0	81	89
175l. „ 200l. ....	92.0	8.0	215	221
200l. and over ... ..	98.6	1.4	793	834

The particular examples given in the Report in illustration of the point at issue are thus borne out to the full by the general trend of the aggregate figures. The fact that the trades with net output exceeding about 150l. per head of those employed are subject to

conditions separating them from the general mass is even more clearly brought out here than in earlier tables (see pp. 562 and 565).

When we examine the aggregate figures for England and Wales, for Scotland, and for Ireland separately, it is found that the net output per head is highest in the southern division of Great Britain and lowest in Ireland. It is not possible to make a detailed comparison for all trades, because the separation of the figures of output would in some cases afford information as to particular firms in one or other of the countries, and might do so in others. From the obligation imposed by the Census of Production Act to preserve the secrecy of the business of individual firms, it results that we cannot institute a completely comprehensive comparison between the data for the several divisions of the United Kingdom. The trades for which the net output is not available, except for the United Kingdom as a whole, employed 943,105 persons, or rather more than one-seventh of those included in the table showing the sex classification above. They were, however, not equally divided between the sexes, for under one-ninth of the males were included, as compared with nearly a quarter of the females. The particulars which can be shown separately for the geographical divisions, therefore, are not directly comparable with those previously given. It is, consequently, necessary to revise the table of persons employed, eliminating from the previous figures those which cannot be analysed on a geographical basis. The results are summarised below :—

*Numbers employed in England and Wales, in Scotland, and in Ireland, so far as they can be separately shown.*

Average net output per head.	England and Wales.		Scotland.		Ireland.	
	Number employed.	Per cent. males.	Number employed.	Per cent. males.	Number employed.	Per cent. males.
Under 50 <i>l.</i> .....	10,582	33·8	20,607	24·7	42,720	34·7
50 <i>l.</i> and under 75 <i>l.</i> .....	1,120,272	38·5	239,316	39·7	126,994	51·3
75 <i>l.</i> „ 100 <i>l.</i> .....	1,195,825	85·1	198,723	91·0	10,736	58·3
100 <i>l.</i> „ 125 <i>l.</i> .....	1,731,224	95·6	171,120	90·6	15,965	79·7
125 <i>l.</i> „ 150 <i>l.</i> .....	52,737	87·0	123,237	97·6	11,185	94·6
150 <i>l.</i> „ 175 <i>l.</i> .....	64,018	74·6	10,792	89·2	164	99·9
175 <i>l.</i> „ 200 <i>l.</i> .....	142,060	92·2	7,186	97·1	462	99·4
200 <i>l.</i> and over .....	201,643	98·7	26,910	92·4	11,211	98·0
Total .....	4,518,361	77·8	797,891	74·9	219,437	55·2

The excluded trades are distinguished in the tables of the Appendix by the use of italic type. It may be noted that it has been possible to include shipbuilding in Scotland in the table, but the importance of the Irish shipbuilding industry, the figures for

which are combined with those for England and Wales, in view of the fact that two firms are well known to dominate the Irish industry, prevents the inclusion of the figures for either branch. In other cases in which Irish figures are included with those for England and Wales, the separate statement has not been sacrificed, as the effect on the aggregate figures is but small. So far as this point goes, the figures for England and Wales are probably somewhat lower in the scale than if there were not this small admixture of Irish figures.

It will be of interest to note that the net outputs corresponding to the numbers shown in the last table were 490,497,000*l.* for England and Wales, 79,670,000*l.* for Scotland, 18,689,000 for Ireland, or an average of 109*l.*, 100*l.* and 86*l.* per head respectively. The net output of the 943,105 persons who are excluded from this geographical classification was 87,577,000*l.*, or an average of 93*l.* per head, as compared with an average of 106*l.* per head for those included in that classification. As the net output taken as the basis of classification has been that for the particular geographical division, not that for the United Kingdom as a whole, there results a partial redistribution between the several lines of the table. How far the aggregates are affected may be seen by comparing the figures obtained by the exclusion from earlier tabulations of the trades for which the necessary geographical details are not available with the summation of this last table.

*All trades available for the geographical comparison.*

Average net output per head.	Classified on United Kingdom output.		Classified as in the preceding table.	
	Number employed.	Per cent. males.	Number employed.	Per cent. males.
Under 50 <i>l.</i> .....	32,613	31·9	73,909	31·8
50 <i>l.</i> and under 75 <i>l.</i> ....	1,491,943	39·5	1,486,582	39·8
75 <i>l.</i> „ 100 <i>l.</i> .....	1,430,987	83·9	1,405,284	85·7
100 <i>l.</i> „ 125 <i>l.</i> .....	1,223,591	91·4	1,518,309	94·1
125 <i>l.</i> „ 150 <i>l.</i> .....	900,472	97·9	187,159	94·4
150 <i>l.</i> „ 175 <i>l.</i> .....	51,427	81·2	74,974	76·8
175 <i>l.</i> „ 200 <i>l.</i> .....	164,830	92·0	149,708	92·5
200 <i>l.</i> and over .....	239,826	98·6	239,764	98·0
Total .....	5,535,689	76·5	5,535,689	76·5

The percentage of female labour in the several groups is thus not seriously affected by the revision of the basis of the classification, except in the 150—175*l.* group, and, in a less degree, in the two groups of next lower grade. It appears, therefore, that in Ireland there is a relatively large proportion of male labour in the 50—75*l.* group, and that group dominates the general position. In Scotland,

the percentage of male labour is somewhat higher than in England for the groups with between 50*l.* and 100*l.* net output per head. Further, the relatively high proportion of female labour in the groups with between 125*l.* and 175*l.* net output per head is a dominantly English phenomenon.

It will be observed that the three groups at the top of the table comprised 51·5 per cent. of the employees in England and Wales, 57·5 per cent. in Scotland, and 82·2 per cent. in Ireland. The left-hand half of the last table shows 53·4 per cent., the right-hand half 53·6 per cent. in these three groups. In the trades which have had to be excluded from these tables, because of the risk of disclosing details affecting individual businesses, 77·4 per cent. of the employees were in these groups.

We see, then, that the relative position of the three divisions of the United Kingdom is not wholly a matter of the presence in certain of these divisions of industries of special character, but is shown in the same industries, and is a phenomenon of much interest and no small importance. Further, the inequalities of the distribution of wealth, of which we hear a good deal, are in some degree paralleled by inequalities in production of wealth. We have not the information needed to show what proportions of the different amounts of net output provide the wages of the operatives, but there can be little doubt that there is a strong link between the magnitude of the net output and the magnitude of the wages paid, at any rate if some exception be made for the higher grades of net output. I will not attempt to discuss which is cause and which effect of the two phenomena named, or whether there is interaction between them, so that each is in turn cause and effect.

The consideration of such figures as have been given above suggest that some interesting results might be secured if there were applied to the detailed figures such a procedure as has been employed in certain investigations of household budgets. It will be recalled that, to determine the relation of means to needs, some writers have computed the equivalent in standard adults—average adult men, that is to say—of families variously composed as to age and sex. If one could similarly compute the net output per head of equivalent adult males, trade by trade, using some reducing factors to apply to the numbers of women, of boys and of girls employed, especially in view of the occurrence of half-timers in certain trades, the relative position, in the tables from which the preceding summaries have been prepared, of many trades might be considerably changed, and the appearance of the tables altered correspondingly. Such attempts to determine the degree of importance of the fact that, in the process of arriving at net output per head, the divisor,

viz., the number employed, is not made up of equivalent units, may be left to the speculatively inclined. It is, of course, impossible to arrange an entirely satisfactory basis for such calculations, for the difference between the different units of the divisor is not merely one of which sufficient account can be taken by a consideration of sex and by distinguishing between juveniles and adults. Even in spite of the fact that only two features commonly connecting differences of productive efficiency are expressed in the available data, speculation as to the possibility of reducing or modifying the apparent contrasts in net output per head might justify a trial of the procedure suggested by the analogy of the family budgets. I pass, however, to another point, namely, the connection between the mechanical assistance given to human labour, and the results of that labour. In the table on p. 567 the average horse-power per person is shown for each of the groups into which the particulars have been classified, and, as might be expected, the magnitude of the net output tends to vary with the power employed, subject to a peculiar break at the point at which irregularity in the progressive relation of female labour to output was found. I leave the figures to speak for themselves, merely noting that the very large figure shown in the highest group is due to the inclusion in that group of the electricity undertakings, which, to a considerable extent, provide motive power for other industries. Were these excluded, the figures of 793 and 834 shown for the highest group would be reduced to 172 and 182 respectively, or less than those shown in the preceding group.

The records of electricity purchased show that about one-third of the electric energy produced by the electricity undertakings was purchased by other establishments making returns to the Census of Production Office. In addition, these establishments produced for themselves somewhat more than double the amount purchased, so that the amount of electricity used for lighting and power in 1907 by productive establishments other than those engaged in the business of electric generation was about equal to the amount generated by these undertakings.

If we examine the records as printed in the Report, we find some striking variations in the degrees in which their generating plant was utilised by firms in different trades. Taking the Board of Trade unit at its nominal relation to the rating of the dynamos, it would appear that the dynamos were used for periods ranging from an average of about one hour per day to an average of twelve hours per day inclusive of Sundays. I have estimated, on the basis of the Returns made (which do not, it may be remarked, cover the whole of the dynamos owned, as Returns were not forthcoming as to the electricity



generated by about 11 per cent. of the total capacity), the capacity of the dynamos which would have been needed, if operated in each trade for the average period shown, to provide the electricity purchased, and find that the engine-power returned would have needed to be increased by about one-half. In this estimate, the electricity supply undertakings are, of course, not included. It further appears that an average of about 1,500 Board of Trade units would, on this basis, be generated per kilowatt of capacity, as compared with about 1,400 units per kilowatt shown by the supply undertakings, and over 1,800 for other establishments. The difference between the 1,500 and the 1,800 arises from the fact that the relative importance of each trade in the one average is in proportion to electricity purchased, in the other to electricity generated.

The engine-record for all industries whose Returns were made on a profit basis showed a total of 10,030,861 horse-power, a total which included engines used as stand-bys, and possibly some which may never be put in action again. Of the total about 25 per cent. would be needed to drive the dynamos recorded, if it be supposed that they were used for that purpose alone. It may be instructive, however, to note that the engines of all establishments other than electric supply undertakings were recorded as having a horse-power of about 8,470,000, and that, of this, about 900,000 horse-power would apparently be needed to operate the dynamos recorded as owned in these establishments. Thus the proportion of the power needed for this work is reduced to below one-ninth in place of the one-fourth which results from including the supply undertakings in the general aggregate. As has been stated above, an important fraction of the output of the supply undertakings is used in the other establishments covered by the record.

Closely connected with the subject of the supply of power is that of coal consumption. In regard to this, as in that of generation of electricity, the Returns secured were not exhaustive. It appears, however, to be possible to compute with some degree of certainty, the total amount of coal used by the establishments making Returns of their output. It may not be precisely true that the coal used varied with the net output, but, in view of the large proportion of the output covered by Returns of coal used which were received, an estimate based on the assumption that the omitted firms used a quantity of coal in similar proportion to net output to that used by firms making Returns will afford a fairly accurate idea of the relative demands for coal by different industries. As particulars of fuel used were not, in general, secured from workshops, the calculation which gives the results set out below has been made on the basis of the

output of the establishments using power alone, except in such cases as blacksmiths' shops or bakehouses, where Returns were received from workshops as well as from other establishments, and where, as will be recognised, fuel consumption is by no means confined to places where mechanical power is generated.

In addition to the coal shown in the table, there was used in blast furnaces in 1907 a total of 21,120,000 tons of coal, and about 15,400,000 tons were carbonised in gas-works.

*Estimated coal consumption in industry.*

Groups of trades.	Calculated coal consumption. 000 tons.	Horse power of engines at factories. 000 h.p.	Average number employed.	Net output. £000.
Mining and quarrying .....	18,799,*	2,495,	965,230	119,531,
Iron and steel, shipbuilding } and engineering, &c. .... }	15,823,	2,089,	1,256,344	131,959,
Other metal trades .....	1,171,	84,	114,473	11,893,
Textile trades .....	10,072,	1,988,	1,253,044	94,334,
Clothing trades .....	835,	85,	754,793	47,568,
Food and drink trades .....	4,077,	380,	463,536	89,505,
Chemical and allied trades ....	4,545,	215,	127,842	21,557,
Paper and allied trades .....	2,177,	238,	325,005	33,582,
Leather and allied trades .....	596,	55,	84,724	8,618,
Timber trades .....	650,	174,	239,160	21,442,
Building and allied trades ....	7,790,	431,	719,608	60,051,
Miscellaneous trades ... ..	69,	9,	46,874	4,443,
Public utility services.....	3,658,	1,790,	128,161	31,950,
Total .....	70,262,	10,033,	6,478,794	676,433,

\* Including coke used at coal mines, coke ovens and manufactured fuel works.

As in most of the preceding tables the Returns on a cost basis are excluded also in this calculation. These account for a further 1,000,000 tons of coal used for industrial purposes.

There is shown, on the average, seven tons of coal per horse-power, and eleven tons per person employed, while on the average the net output was about  $9\frac{1}{2}l.$  for each ton of coal used. There are wide variations from these average figures, but they may afford a general conception of the relations shown. The more notable variations are due to the inclusion of important amounts of coal used for purposes other than the generation of power, as in brick-making, in the chemical trades and in bakehouses. In the timber trades, coal is supplemented as a fuel by the refuse of sawmills, while some grain mills use wind or water power. It may also be remembered that there has already been given one illustration of a fact which should not be lost sight of, namely, that the recorded engine power is not by any means continuously employed.

The Mining and Metal Trades are seen to account for one-half the computed coal consumption shown in the table, while the Textile and Building Groups are the next largest users and account together for a further quarter of the aggregate shown. If we add in the coal consumption of blast furnaces (21,120,000 tons), the Iron and Steel group will be found to use 40 per cent. of the ninety odd million tons consumed in productive industry.

It should be explained that, except as shown in the footnote to the table, coke consumed has not been brought into the calculation, a proceeding based on the probability that much, if not all, of it was gasworks coke. In the engineering trades, in cement works, in bakehouses and in laundries, the consumption of coke is, however, relatively important, while in gasworks themselves the principal fuel used is coke. In general the relative position of the groups is not affected to an important extent by the omission of the coke, while it would be misleading to treat it as an addition to the total demand of industry on our coal mines.

As the coal raised in 1907 was 266,560,000 tons, and 63,601,000 tons were exported, while 18,619,000 tons were shipped as bunker coal on foreign-going steamers, the industrial consumption above-estimated amounts to approximately one-half of the retained 184,340,000 tons. The gasworks consumption for making gas has been already stated as about 15,400,000 tons; the railways used 12,923,000 tons for locomotive purposes and 2,150,000 tons were shipped as bunkers on coastwise steamers. There remains about 61,500,000 tons for all domestic purposes and for use in mercantile establishments.

In the preceding part of this paper the figures which have been used to represent the numbers employed have throughout been the averages of the numbers returned. For workshops the information supplied was, in general, a figure representing the number ordinarily employed, so that no information as to fluctuations of employment are available in their case. For factories, however, the number at work on the last Wednesday in each of the four months, January, April, July and October was asked for. The resulting figures cannot be taken as affording any measure of the degree of irregularity of employment of individual persons, but they may probably afford some idea of the extent of regularity of employment in the mass. From this point of view, they are really quite remarkable. In most cases, the fluctuation between the date when the smallest trade aggregate of employed was shown and that of the largest figure recorded is not very marked. This may be illustrated from the following summary for groups of trades, in which there is a reversion to the basis of the first figures given in this Paper, that is to say,

the Returns on a cost basis are included. The January figure applies, in a number of cases, to January, 1908.

*Variation of employment in 1907.*

Group of trades.	Numbers at work in factories on the last Wednesday in			
	January.	April.	July.	October.
Mines and quarries .....	946,318	963,818	969,793	981,010
Iron and steel group .....	1,481,270	1,492,950	1,496,744	1,481,540
Other metals .....	101,610	101,449	101,086	102,774
Textile group .....	1,221,289	1,223,837	1,227,856	1,232,461
Clothing group .....	435,215	443,939	440,790	441,415
Food and drink group .....	365,941	367,416	378,459	377,625
Chemical group .....	123,846	124,772	120,449	122,057
Paper group .....	305,971	306,647	304,424	310,127
Leather group .....	68,244	69,071	68,267	67,422
Timber group .....	174,557	178,926	178,146	178,814
Building group* .....	665,944	737,399	741,230	701,072
Miscellaneous .....	34,438	34,237	34,365	35,475
Public utilities group .....	331,068	317,895	313,710	324,853
Total .....	6,255,221	6,362,356	6,375,319	6,356,645

\* In this group *all* employees in the Building and Contracting trades are included.

Within the several groups and, indeed, within the individual trades there occur variations which are of importance to those concerned, but are not expressed in the figures summarised in this table. The extreme of variation in the aggregate numbers is shown between January and July, but does not reach two per cent. In individual groups, however, we find considerable variations, notably in the Building group, where the range is nearly 11 per cent., while in the Public Utilities group there is a range of about 6 per cent. compensatory in its effect, so far as it goes, to that in the Building group. The attention of the Society has been drawn by Mr. Popplewell, in a recent Paper, to the relation of individual members of these groups, namely, the gas works and the brickfields. Time will not permit of a detailed examination of all the trades showing large variation, but I may direct the attention of those interested to the information afforded by these data, though the lack of the corresponding figure for the 10 per cent. of the workpeople in workshops not covered by the table may mask the worst of the irregularity of demand for labour. It may be worth while, before passing on, to note that, in the Clothing group and in the Food group we find the next most important ranges of variation. In the former, the workshop data (which are, it may be observed, included in the figures for building) are lacking, and the indications are therefore much reduced in value, apart from the fact that it is in the clothing and building groups that the most important leakages,

from the point of view of the universality of the Returns, are believed to have occurred. The expansion of 2 per cent. in the numbers employed between January and April is, however, significant of known fluctuations in the clothing trades, and the recession in July is partly masked in the table by the continued expansion of the laundry trades in the summer.

The expansion of  $3\frac{1}{2}$  per cent. in the numbers employed in the Food and Drink group between January and July is also significant of familiar changes. The Cocoa, Confectionery and Fruit Preserving Trade expanded, while Brewing and Distilling fell off in the interval, leaving but a small balance of expansion. The Aerated Water Trade and the trades grouped with it (Cider, British-made Wines, Non-Alcoholic Beverages (brewed) and Vinegar) show, however, the expansion which determines the group movement, the July figure being 26 per cent. greater than that for January. There are a number of other interesting features in the details of these employment figures, but this paper is already too long, and I must pass to my final topic, namely, the use made of the data afforded by the Census of Production to build up an estimate of the National Income.

The relation of the Census of Production data to the question of national income is obvious, since, viewed from the standpoint of goods, the consumption of the nation must be deducible from the production and the external trade, while the income of the individuals composing the nation is exchanged for these goods and for services of an immaterial nature. If a reasonable estimate of these immaterial services can be made, the record of goods completes the information needed. Saving is here included with consumption, since it has its concrete expression in the acquisition of goods, or claims to goods, the consumption of which takes place in the process of further production, or which are consumed slowly as they give off the services which they are adapted to render.

The goods consumed, however, when regarded as the exchange equivalent of income, are valued after passing through the hands of merchants, wholesale and retail, processes of adaptation for use after acquisition by the consumer not being valued, as one does not set a value on the work done by oneself in preparing, for example, food for eating. A line has to be drawn somewhere, and the most easily-defined line is drawn when the last process of exchange before consumption takes place is reached.

We need, then, three pieces of information, namely :

- (a) The value of the goods as they leave the hands of producers.
- (b) The value added in the processes of trade and transport.
- (c) The value of services (other than those involved in the production and distribution of material goods) rendered for money or its equivalent.

The first of these is deducible with more or less precision from the data provided by the Census of Production, the other two must, in the present state of our knowledge, be the subject of estimate. The first is, however, considerably the most important of the three. The figure needed is that which relates to the aggregate value of the goods produced after elimination of all duplicate entries; to give clearness to the idea, one may call it the value of the output as it might be summed up if, without altering the technical processes, or the aggregate amount of profits, the entire field of production were owned by one vast corporation, so that the passage of partly manufactured goods from one stage to another would be a matter of internal bookkeeping and would not affect the figures expressing final results of manufacture. For the industries covered by the Returns to the Census of Production Office this figure has been estimated, as stated at the outset of this paper, at 1,280 to 1,295 million £ inclusive of duties on all dutiable goods except spirits. The uncertainty in the figure arises from uncertainty in the amount to be allowed for charges of merchandising and transport of partly manufactured goods as they pass from establishment to establishment. The make-up of the figure is simple, for the net output, known from the Returns (to which an estimated addition of 50,000,000*l.* is made in respect of omissions in cases where Returns were not procurable) is added to the cost of materials obtained from sources outside the field of enumeration, and an allowance for the charges just referred to completes the calculation. The estimate of the value of the materials is based partly on the information obtained by the Agricultural Departments of Great Britain and Ireland, supplemented by that afforded in Mr. Rew's paper on "The Nation's Food Supply," printed in the *Journal* for December last, and partly on the statistics of foreign trade. Estimates of the amount of duplication occurring between the agricultural (and fisheries) totals and the manufacturing totals are necessary, and a further item which is based on estimates made in the Census Office is the value of industrial materials derived, not from extractive industries, but from the refuse of consumption. The amount of this last item is so small, relatively, that a considerable error in the estimate will not seriously affect the resulting aggregates. The result of the processes just described, covering the output of both agriculture and manufacture, and taking imports and exports into consideration, is to give a value of 1,235 to 1,270 million £ as representing the value of goods available for consumption in the United Kingdom in 1907, taken at the factory or port, and inclusive of duties of customs or excise.

The second of the items of information required was only

capable of comparatively rough estimate, and, though inquiries made sufficed to enable such an estimate to be framed, those inquiries cannot pretend to anything like exhaustiveness. They result in assigning a sum estimated as lying between 428 and 563 million £ for trading and transport charges between factory or port and consumer. So far as the numbers of those whose livelihood is derived from these departments of our national life can be judged from reports of past censuses of population, the values per head produced by their efforts do not, on the average, differ very widely from those discussed earlier as resulting from manufacturing operations. This point will be able to be more effectively tested when the detailed reports of the population census of 1911 become available.

The third of the items of information needed was again capable only of rough estimate. I do not propose this evening to enter into the details of the estimate, but, to complete the statement, will merely cite the aggregate result of estimating the various items making up the total of services exchanged for material goods or for other services. It is, as a matter of fact, not separately stated, being made up of a figure of 350 to 400 million £ and that part of the total estimated savings of 320 to 350 million £ which was contributed by the class whose income is in question.

This estimate of savings is the result of a calculation, partly based on data contained in the Census of Production Returns, partly on outside data. From the Census of Production Returns it is possible to select from the mass of final products all those whose nature shows that they are intended as production goods, not as consumption goods, to use a phraseology familiar in certain economic treatises. These production goods are, however, not available as increases to the capital equipment of the community until provision has been made for making good the effects of wear and tear, so that capital equipment is physically maintained. The available 350 to 360 million £ must be diminished in proportion to the needs for this purpose, but those needs are partly unknown, and some estimate of their amount was therefore essential.

We are thus face to face with the problem of valuing the capital equipment of industry, while the data for the purpose are sadly inadequate. On the principle that a rough estimate is better than none for the purpose in hand, an attempt was made to provide such an approximate figure. For some part of the total there were data of a usable kind, namely for gas, water and electricity supply, while for mining it was believed that a basis of estimate frequently used by some who may be regarded as experts would suffice for the purpose. It was, further, found that in such cases as the cotton trade and iron and steel works, either accepted estimates or the

recorded capital of Joint Stock Companies bore a relation to the net output sufficiently similar to the corresponding relation shown in United States Census records to provide encouragement in using these latter records as a guide to the general situation in this country. The fact that manufacturing industry is in an advanced stage in the United States appeared to remove some objections to applying another country's figures to our own situation, while the fact that it was not the money value of the capital, but the relation of that money value to another money value, namely, the value addition resulting from industrial processes, which was taken as a guide diminishes the force of another objection. The final result was not out of accord with the other information available, so that it has been used for the purposes of the estimate of depreciation required in the stage of our calculation now under discussion. The capital of the establishments covered by the returns to the Census of Production Office is, then, roughly estimated as lying between 1,400,000,000*l.* and 1,600,000,000*l.* Careful consideration of the proportion of the total probably representing buildings and plant in different groups of industries results in an average figure of somewhat under two-thirds, so that about 1,000,000,000*l.* of capital need to be provided with a wear and tear allowance.

I think that one may summarise the impression produced by company reports and company chairmen's speeches fairly in the statement that depreciation is, in practice, provided for on a scale depending on the funds available for distribution in the particular year. It may also be calculated by reference to the nature of the different classes of plant to be depreciated, using recognised or conventional rates for the several classes. The latter more nearly corresponds to the conception of the requirements of the case expressed in the calculations of the General Report; but it may not be improper to recall that, as we are considering the application of a complex of goods forthcoming in response to the demands of the actual situation, the former mode of treating the matter may not be entirely foreign to the case before us, especially in view of the fact that 1907 was, in many trades, a year of great prosperity, and consequently of exceptional opportunities for making, from that year's results, more than ordinary provision for the maintenance and replacement of plant.

The estimate made of the requirements for these purposes in the industries covered by the Census is from 75 to 85 million £, of which 10 million £ was provided in materials used by the repairing staffs of manufacturing firms and included in the aggregate cost of materials returned to the Census of Production Office, the remainder being chargeable on net output. In consideration of the magnitude



of the sum in question, in relation on the one hand to the net output of the industries concerned, on the other to the value of capital goods produced in the year, it would appear that the mode of estimating the aggregate manufacturing capital cannot be fundamentally wrong. Taking, further, into account corresponding needs for maintenance of the remainder of the capital of the United Kingdom, there results an estimated requirement for maintenance and renewals of about one-half the capital goods available.

The data for completing the estimate for national income have now been passed under review, with the exception of (a) additions to consumption capital, for which the data of the Census afford a rough guide; (b) the addition to investments abroad, whether these investments consist in the equipment of establishments abroad with machinery, &c., of our own production, or of the acquisition, in exchange for other of our exports or for claims otherwise arising, of the ownership of property abroad. The compilations of writers who make a regular practice of collecting data of new investments abroad yield a total for 1907 of about 100,000,000*l.*

Summing up the various elements in the calculation we arrive at a total estimated income for the inhabitants of the United Kingdom in 1907 of 2,000,000,000*l.* within less than 10 per cent. above or below so far as the estimates may be regarded as within the mark. These estimates, then, show about one-sixth of the national income as saved, about a quarter as due to trade and transport within the country, and about a third as representing the value added in productive industries (after deduction of the allowance for wear and tear of plant) using the word productive in the sense in which it is commonly employed, and without any purpose of raising a discussion on the proper connotation of the term.

The problem of the value of the capital wealth of the country was, happily, one which it was not necessary to re-examine, though, in view of the importance of the necessary provision for its renewal and maintenance, and the fact that the bulk of the provision for such renewal and maintenance is derived from the output of the industries whose returns it was the work of the Census of Production Office to examine, the amount which may be accepted as representing the capital wealth is naturally of great importance in connection with the results of the Census. It is a pleasure to know that the Society may hope to hear more on this subject in the near future from Mr. Bernard Mallet, whose further contribution will be awaited with much interest.

In closing I may be allowed to express the hope that, as in the case of the First Census, the Census of Production Office will

receive the cordial co-operation of manufacturers in making their Returns for the Second Census, the schedules for which have now practically all reached the hands of those whose duty it is to fill them up. In view of the somewhat narrowed scope of the Second Census (in that the building trades are not to be called on for Returns on this occasion, nor are those who are solely engaged in laundry work or bottling, while in all trades establishments employing five persons or less on the average are to be exempted on declaring the fact), the proper comparison of the results of the Second Census with those of the first will necessitate the preparation of some information not at present published, namely, the separate totals for the firms employing five persons or less. We shall thus be placed in possession of an item of information which will be of no small interest in itself. It may be hoped that the restrictions which have been admitted for the purposes of the Second Census will facilitate considerably the work of securing the Returns, and enable the work of compilation to be proceeded with more speedily than on the first occasion. In this matter everything depends on the willingness of manufacturers to afford the information asked for; and if they will realise the value and national character of the work in which they are invited to take a share, their assistance will enable the Census Office to expedite the performance of the duties with which it is charged.

## APPENDIX.

In cases marked thus \*, the output is valued at cost.

Persons of 18 years of age and upwards are classed as adults except in cases marked thus †, where the line of division is taken at 16 years.

Separate particulars of the classification of persons employed are not available for the several divisions of the United Kingdom in the case of the trades the names of which are printed in *italics*. In these cases only totals for the United Kingdom are published.

Trade.	Net output per head.	Average numbers employed (excluding outworkers).				Establishments using power.		Workshops (not using power).	
		Boys.	Men.	Girls.	Women	Net output.	Number employed.	Net output.	Number employed.
Flax scutching .....	£ 19	229	2,516	94	1,023	£000. 74,	3,862	£000. —	—
Fish curing .....	30	632	6,214	503	17,959	73,	1,531	695,	23,777
Velvet and fustian cutting .....	33	40	751	788	1,864	62,	1,851	50,	1,592
Local Authorities, Ireland .....	36*	191	26,590	—	61	730,*	17,109	224,*	9,733
Army bakeries .....	47*	—	136	—	—	2,*	58	4,*	78
	32	1,092	36,207	1,385	20,907	941,	24,411	973,	35,180
Flock and rag .....	52	139	1,631	581	4,034	132,	2,120	199,	4,265
Cardboard box .....	52	1,054	3,779	5,133	11,402	937,	17,601	177,	3,767
Hatters' fur .....	53	25	276	230	1,494	106,	1,933	2,	92
Silk .....	55	2,123	7,947	5,613	16,515	1,750,	32,051	12,	147
Laundries .....	55	4,011	18,796	16,673	92,041	6,250,	106,177	959,	25,344
Army laundries .....	57*	—	42	—	78	7,*	108	0,*	12
Toys and games .....	59	234	565	454	609	61,	963	49,	899
	54	7,586	33,036	28,684	126,173	9,243,	160,953	1,398,	34,526
Jute, hemp and linen .....	61	11,341	38,206	21,554	83,395	9,426,	154,293	26,	203
Hosiery .....	61	1,892	11,125	9,973	28,223	3,013,	48,398	126,	2,815
Clothing .....	62	12,093	85,209	81,980	262,793	11,144,	192,701	16,183,	249,374
Royal Army Clothing Factory .....	63*	6	152	23	1,372	98,*	1,553	—	—
Needles, pins, &c. ....	64	682	3,838	2,404	6,328	799,	12,324	47,	928
Artificial flowers, &c. ....	64	45	351	996	2,214	—	—	232,	3,606
Wigmaking .....	64	22	217	229	402	—	—	56,	870
G.P.O. (telegraphs and telephones) .....	64*	538	9,480	—	153	655,*	10,171	—	—
Office of Works (blind and carpet stores) .....	65*	21	14	—	—	—	—	2,*	35
Board of Public Works (Ireland) .....	66*	2	549	—	31	38,*	582	—	—
Hats, caps and bonnets .....	67	1,838	12,047	3,125	14,100	1,399,	21,383	671,	9,727
Basket and wickerwork .....	67	458	2,584	137	436	34,	520	208,	3,095
Salt mines and works .....	67	367	3,930	139	300	319,	4,736	—	—
Mines, other than coal and iron .....	68	662†	17,297†	28†	246†	1,168,	17,116	63,	1,117
Local Authorities, Scotland .....	68*	153	15,205	3	82	850,*	10,236	198,*	5,207
Elastic webbing .....	68	243	1,320	792	1,815	279,	4,090	4,	80
China and earthenware .....	68	6,276	33,724	7,815	20,353	4,514,	66,308	116,	1,860
Cocoa nut fibre, &c. ....	68	466	2,433	745	2,638	377,	5,448	50,	834
Canvas goods .....	68	332	2,923	570	3,638	402,	5,743	107,	1,720
Tramway, &c., companies .....	68*	213	4,268	1	15	290,*	4,273	17,*	224
Saddlery and harness .....	68	1,654	10,603	893	2,593	462,	6,827	615,	8,916
Naval Ordnance Department .....	69*	44	1,074	—	—	77,*	1,118	—	—
Local Authorities, England and Wales .....	69*	2,162	140,134	16	689	8,815,*	119,141	1,121,*	23,860
	64	41,510	396,683	131,423	431,816	44,159,	686,961	19,842,	314,471

Trade.	Net out- put per head.	Average numbers employed (excluding outworkers).				Establishments using power.		Workshops (not using power).	
		Boys.	Men.	Girls.	Women	Net output.	Number em- ployed.	Net output.	Number em- ployed.
	£					£000.		£000.	
Woollen and worsted .....	70	22,579	91,757	35,306	114,379	18,270	260,303	327,	3,718
Railway companies .....	71*	13,236	226,786	260	1,558	17,058,*	240,716	48,*	1,124
Blacksmithing .....	71	3,025	17,615	24	225	540,	6,307	988,	14,582
Boots and shoes .....	71	15,059	76,099	10,822	24,846	7,534,	105,202	1,451,	21,624
Naval Establishments (build- ings) .....	71*	98	4,389	—	1	319,*	4,488	—	—
Watch and clock making .....	72	631	3,410	365	895	217,	2,824	165,	2,477
Slate quarries .....	72	892†	13,499†	—	9†	974,	13,314	70,	1,086
National Telephone Company...	73*	382	6,646	—	—	—	—	510,*	7,028
Cutlery .....	73	1,488	10,286	967	2,090	888,	10,786	193,	4,045
Quarries, other than slate, iron and limestone .....	75	1,158†	40,448†	—	62†	2,522,	32,800	603,	8,868
Rope and twine .....	75	2,182	4,780	1,802	5,495	965,	12,345	107,	1,914
Manufactured stationery .....	75	2,043	8,501	4,896	10,787	1,750,	22,665	227,	3,562
Pens, pencils, &c. ....	77	379	1,551	908	3,530	483,	6,283	7,	85
Travelling bags .....	77	718	3,049	1,083	1,955	248,	3,221	276,	3,584
Brushes .....	77	1,134	5,783	1,205	3,020	643,	8,142	216,	3,000
Ivory, bone, &c. ....	77	1,406	6,449	1,789	3,631	706,	8,815	322,	4,460
Brick and Fireclay .....	78	8,945	56,303	493	3,851	5,247,	66,108	210,	3,484
Cotton .....	79	51,153	168,827	89,761	262,321	44,976	571,379	31,	683
Canal, &c., companies .....	79*	309	7,032	—	6	533,*	6,667	47,*	680
	75	126,817	753,210	149,681	438,661	103,873,	1,332,365	5,748,	86,004
Umbrellas, &c. ....	81	728	3,461	751	2,623	429,	5,524	181,	2,039
Locks and safes .....	82	908	5,665	419	930	595,	6,981	51,	941
Timber .....	82	10,704	64,696	848	1,975	5,808,	67,115	625,	11,108
Carriages and wagons .....	82	4,291	31,152	164	755	1,964,	20,831	1,027,	15,531
Anchor, chains, &c. ....	83	3,424	14,411	2,633	7,556	2,211,	25,833	103,	2,191
Fellmongery .....	83	142	1,575	2	45	81,	1,165	66,	599
Building and contracting .....	84	38,361	472,358	688	2,586	22,662,	250,880	20,264,	263,113
Cocoa, confectionery, &c. ....	84	3,158	18,558	11,603	27,973	4,930,	58,211	208,	3,081
Office of Works (building) .....	84*	16	539	—	8	—	—	47,*	563
Naval Victualling Yards .....	86*	—	29	—	—	2,*	29	—	—
Limestone quarries .....	87	364†	15,811†	1†	17†	1,043,	11,366	371,	4,827
Galvanised sheet, hardware, &c. ....	87	9,407	47,476	5,369	12,525	5,774,	63,822	767,	10,955
Printing and bookbinding .....	88	23,463	94,432	19,385	36,836	14,789,	165,971	555,	8,145
Tools and implements .....	88	3,503	17,810	636	1,762	1,905,	20,191	185,	3,520
Finished brass .....	89	5,415	25,360	1,937	6,204	3,248,	36,915	206,	2,001
	85	103,884	813,333	44,436	101,795	65,441,	734,834	24,656,	328,614
Coopering .....	91	642	4,265	5	27	284,	2,673	166,	2,266
Gloves .....	91	338	2,035	703	1,752	389,	4,186	51,	642
Crates, &c. ....	91	2,355	9,107	299	1,012	1,098,	11,906	70,	867
Plate and jewellery .....	94	4,227	20,342	4,061	9,758	3,055,	31,763	544,	6,825
Glass, stone, &c. ....	94	8,697	38,518	856	2,615	3,856,	40,545	906,	10,141
Matches, &c. ....	96	260	982	937	2,077	398,	4,095	11,	161
Thinplate .....	97	2,910	15,113	792	1,813	2,009,	20,628	—	—
Shipbuilding (Government Yards) .....	97*	1,607	23,687	4	282	2,470,*	25,369	19,*	211
Lace .....	98	2,604	13,777	5,422	15,037	2,761,	28,677	834,	8,163
Shipbuilding .....	98	21,344	165,751	179	1,038	18,234,	184,817	300,	3,495
Royal Ordnance Factories .....	100*	911	13,425	—	197	1,452,*	14,533	—	—
	97	45,895	307,002	13,258	35,608	36,006,	369,192	2,901,	32,571

Trade.	Net output per head.	Average numbers employed (excluding outworkers).				Establishments using power.		Workshops (not using power).	
		Boys.	Men.	Girls.	Women	Net output.	Number employed.	Net output.	Number employed.
	£					£000.		£000.	
<i>Furniture, &amp;c.</i> .....	101	14,297	64,634	2,904	10,271	7,415,	66,389	1,884,	25,717
<i>Bleaching and dyeing.</i> .....	101	11,758	73,357	4,622	14,076	10,425,	103,202	58,	611
<i>Billiard tables, &amp;c.</i> .....	101	658	4,096	629	1,127	496,	4,780	162,	1,730
<i>Type founding, &amp;c.</i> .....	102	1,060	4,455	362	642	509,	4,607	157,	1,912
<i>Bread, biscuits, &amp;c.</i> .....	104	15,179	71,495	6,208	17,475	7,264,	60,004	4,256,	50,353
<i>Musical instruments</i> .....	105	1,274	8,326	111	390	827,	7,675	229,	2,426
<i>Scientific instruments</i> .....	108	2,228	8,301	1,194	2,533	1,364,	12,396	171,	1,860
<i>Wrought iron and steel tubes</i> .....	108	3,132	16,875	44	172	2,184,	20,118	5,	105
<i>Cycle and motor</i> .....	109	7,187	39,886	1,915	5,055	5,489,	47,824	412,	6,219
<i>Engineering</i> .....	109	64,354	380,446	5,081	11,822	50,227,	458,568	268,	3,135
<i>Heating, &amp;c., engineering.</i> .....	109	1,362	10,442	500	2,018	1,464,	13,559	103,	763
	107	122,489	682,313	23,570	65,581	87,664,	799,122	7,705,	94,831
<i>Small arms</i> .....	111	452	4,223	31	149	485,	4,177	53,	678
<i>Paper</i> .....	111	3,542	24,079	2,924	10,410	4,542,	40,955	—	—
<i>Fancy fur</i> .....	112	260	2,565	374	2,040	181,	1,809	406,	3,430
<i>Iron and steel</i> .....	115	23,758	234,589	876	2,441	29,893,	260,366	155,	1,300
<i>Wire</i> .....	116	2,714	13,597	641	1,377	2,047,	17,240	73,	1,089
<i>Leather</i> .....	117	2,274	25,058	471	1,107	3,287,	27,870	98,	1,040
<i>Trade photography</i> .....	118	97	542	55	317	55,	393	64,	618
<i>Explosives, &amp;c.</i> .....	118	619	6,601	1,295	4,229	1,482,	12,323	27,	421
	115	33,716	311,254	6,669	22,070	41,972,	365,133	876,	8,576
<i>Oil shale mines</i> .....	122	274†	4,002†	—	—	523,	4,276	—	—
<i>Railway carriage building.</i> .....	123	3,438	25,168	76	175	3,556,	28,773	6,	84
<i>Rubber</i> .....	124	1,998	13,252	1,948	6,841	2,883,	23,424	93,	615
<i>Aerated waters, &amp;c.</i> .....	125	3,324	19,753	479	5,101	3,466,	27,382	111,	1,275
<i>Butter and cheese</i> .....	125	700	6,607	435	1,591	1,162,	9,259	6,	74
<i>G.P.O. (printing and envelopes)</i> .....	126*	17	20	—	—	5,*	37	—	—
<i>Coal mines</i> .....	127	59,769†	773,373†	645†	4,799†	105,735,	833,531	355,	5,055
	126	69,520	842,175	3,583	18,507	117,330,	926,682	571,	7,103
<i>Cement</i> .....	132	900	13,807	7	105	1,940,	14,691	15,	128
<i>Lead, tin, &amp;c.</i> .....	133	540	6,664	355	674	1,067,	7,811	30,	422
<i>Copper and brass</i> .....	137	2,540	18,108	169	631	2,802,	20,231	128,	1,217
<i>Asbestos, &amp;c.</i> .....	137	104	1,628	100	517	308,	2,221	13,	128
<i>Preserved meat, pickles, &amp;c.</i> .....	141	521	5,385	1,583	5,774	1,739,	11,198	136,	2,065
<i>Bacon-curing</i> .....	146	357	5,560	98	1,245	936,	6,306	123,	954
<i>Ordnance Survey Department</i> .....	148*	26	315	5	87	64,*	433	—	—
	137	4,988	51,467	2,317	9,033	8,856,	62,891	445,	4,914
<i>Fertilisers, &amp;c.</i> .....	154	660	10,702	174	908	1,903,	12,312	17,	132
<i>Tobacco</i> .....	155	1,929	10,285	9,035	16,399	5,541,	33,317	276,	4,331
<i>Bottling</i> .....	155	3,393	12,782	717	3,373	2,660,	16,362	480,	3,903
<i>Soap and candles</i> .....	155	2,326	11,889	1,451	3,052	2,844,	18,185	62,	533
<i>Iron mines</i> .....	155	268†	10,981†	—	3†	1,658,	10,157	90,	1,095
<i>Cattle, &amp;c., food</i> .....	158	203	1,544	24	212	305,	1,938	8,	45
<i>Farinaceous preparations and cleansing and polishing articles</i> .....	174	1,025	5,423	1,839	3,331	1,947,	11,114	71,	504
<i>Manufactured fuel</i> .....	174	50	1,486	—	1	266,	1,527	1,	10
	157	9,854	65,092	13,240	27,279	17,124,	104,912	1,005,	10,551
<i>Grain milling</i> .....	178	1,595	33,511	129	942	6,453,	36,177	—	—
<i>Seed crushing</i> .....	180	201	7,411	3	81	1,388,	7,696	—	—
<i>Chemicals and drugs</i> .....	183	3,554	42,136	1,647	4,920	8,866,	49,052	702,	3,205
<i>Oil and tallow</i> .....	189	319	5,393	15	160	1,051,	5,429	62,	458
<i>Printing and publishing</i> .....	190	6,073	36,792	1,049	2,872	8,831,	46,480	36,	306
<i>Gold and silver refining</i> .....	197	101	1,973	25	88	431,	2,187	—	—
<i>Paint, colour and varnish</i> .....	198	1,175	11,419	170	1,076	2,706,	13,565	38,	275
	185	13,018	138,635	3,038	10,139	29,726,	160,566	838,	4,244

Trade.	Net output per head.	Average numbers employed (excluding outworkers).				Establishments using power.		Workshops (not using power).	
		Boys.	Men.	Girls.	Women	Net output.	Number employed.	Net output.	Number employed.
	£					£000.		£000.	
Gas undertakings—									
Public authorities .....	200	559	27,914	3	98	17,098,	{ 28,500	189,	{ 74
Companies .....	211	1,808	52,833	8	217		{ 53,680		{ 1,186
Ice .....	212	26	1,203	3	13	264,	1,245	—	—
Spirit distilling .....	227	185	6,190	7	143	1,470,	6,491	11,	34
Shale oil works .....	229	311	3,071	2	7	777,	3,391	—	—
Electricity undertakings—									
Companies .....	235	457	7,954	4	84	1,996,	8,499	—	—
Public Authorities .....	254	457	13,559	2	101	3,592,	14,119	—	—
Coke works at collieries .....	273	226	10,669	1	62	2,636,	9,335	357,	1,623
Ink, gum and sealing wax .....	280	94	1,281	100	180	422,	1,344	41,	311
Spirit compounding, &c. ....	354	46	1,045	11	33	366	938	36,	197
Water undertakings—									
Companies .....	366	105	4,583	—	27	7,978,	{ 4,420	1,097,	{ 295
Public Authorities .....	423	287	17,008	1	93		{ 14,518		{ 2,871
Brewing and malting .....	485†	3,126	77,855	189	1,799	40,043,	79,680	1,178,	5,289
Sugar and glucose .....	506§	485	5,798	35	183	3,291,	6,501	—	—
	339¶	10,172	230,963	366	3,040	79,933,	232,661	2,909,	11,880

† Or 331½, exclusive of beer duty.

§ Or 172½, exclusive of duties on sugars, molasses and glucose.

¶ Or 276½, exclusive of beer and sugar duties.

*Summary of the preceding table.*

Net output per head.	Average numbers employed (excluding outworkers).				Establishments using power.		Workshops (not using power).	
	Boys.	Men.	Girls.	Women.	Net output.	Number employed.	Net output.	Number employed.
					£000.		£000.	
Under 50½ .....	1,092	36,207	1,385	20,907	941,	24,411	973,	35,180
50½ and under 60½ .....	7,586	33,036	28,684	126,173	9,243,	160,953	1,398,	34,526
60½ .....	41,510	396,683	131,423	431,816	44,159,	686,961	19,842,	314,471
70½ .....	126,817	753,210	149,681	438,661	103,873,	1,382,365	5,748,	86,004
80½ .....	103,884	813,333	44,436	101,795	65,441,	734,834	24,656,	328,614
90½ .....	45,895	307,002	13,258	35,608	36,006,	369,192	2,901,	32,571
100½ .....	122,489	682,313	23,570	65,581	87,664,	799,122	7,705,	94,831
110½ .....	33,716	311,254	6,669	22,070	41,972,	365,133	876,	8,576
120½ .....	69,520	842,175	3,583	18,507	117,330,	926,682	571,	7,103
130½ .....	4,988	51,467	2,317	9,033	8,856,	62,891	445,	4,914
150½ .....	9,854	65,092	13,240	27,279	17,124,	104,912	1,005,	10,553
175½ .....	13,018	138,635	3,058	10,139	29,726,	160,586	838,	4,244
200½ and over .....	10,172	230,963	366	3,040	79,933,	232,661	2,909,	11,880
Total .....	590,541	4,661,370	421,650	1,310,609	642,278,	6,010,703	69,867,	973,467

DISCUSSION *on* MR. FLUX'S PAPER.

SIR GEORGE PAISH, in proposing a vote of thanks to Mr. Flux, said he thought they would all agree with him that the amount of work put into the Paper was enormous. Rarely had a Paper been read before the Society to which so much work and labour had been devoted. He thought Mr. Flux had been very successful in something more than the mere compilation of the Census. He had succeeded in getting information concerning the work done by over 7,000,000 Englishmen, and, as they knew, it was extremely difficult to get information in this country concerning what people were earning or what results they were obtaining from their businesses. He thought they ought to compliment Mr. Flux on the great ability he had shown in getting so much information from companies and individuals in all parts of the country. The lessons to be learnt from the Paper were many, and Mr. Flux had already given them some of them. It would take a long time to gain all the benefits which the information rendered possible. One of the lessons was that women were in competition with machinery; another that the introduction of machinery was adding very largely to the wealth production of the country from year to year. If they looked at the figures they would see that industries in which machinery was used were very much more productive than industries in which no machinery was employed, and that the industries in which machinery was not used mainly employed women, or a very large proportion of women. He hoped the time was not very far off when they would succeed in increasing the wealth production of the country to such an extent that all the married women could stay at home to attend to their households. With regard to the total figure of wealth production, Mr. Flux had arrived at the conclusion that in 1907 the income of the country was about 2,000 millions, and he had more or less confirmed an estimate which he (the speaker) had made last year, that the income of the country was about 2,250 millions. If they allowed for the expansion since 1907, the two figures were almost identical. There was the difference, however, that in his calculation he had estimated something for the earnings of married women in their own households, whereas Mr. Flux had excluded them. It had never been the practice in any country to include the wealth produced by the married women. If they thought of the matter for a moment, they would realise that the wealth produced by married women was very great. It was true that they did not receive money wages; but the family received value in some form or another. It was a matter of no small importance, especially when one came to compare the income of the various nations and to take into account the relatively large portion of the income contributed by married women in countries where wages were low. It was indeed absurd to leave out the wealth produced by married women. The incomes derived by domestic servants, teachers, &c., were, of course, included, and the work performed by married women was of a similar character. They did the work of the

household ; they made the clothes of the children ; they doctored them and even educated them, and they performed a great many other tasks of great value. The wealth produced by married women thus amounted to a very large sum in the aggregate. With regard to capital, he was very glad that Mr. Bernard Mallet had promised another contribution on this subject. The information they possessed with regard to the capital of the country was very meagre, and he was hoping that some day or other the Census of Production Office would try to ascertain the real wealth accumulated by the country, and that we should no longer depend upon estimates. Mr. Flux had told them that he proposed in the new Census to make additional investigations as to the amount of the income of the transport and distributing industries. They might hope that in time the full income of the country would be exactly compiled, so that there might be no doubt concerning the greatness of the income which this country was now enjoying.

Mr. CHIOZZA MONEY, in seconding the vote of thanks, said it was impossible to praise too highly the great work which Mr. Flux had done. For the first time it had enabled them to form a qualitative analysis of the national dividend as opposed to the quantitative analysis with which they had been content in the past. Those who had thought of these things for some years were not surprised to find that in the United Kingdom, which they should remember was one of the only three great manufacturing countries of the world, the production of manufactures, added to the production of minerals at factory prices, amounted to so small a sum. It was a fact which could be deduced approximately, of course, from the national income ; but to have it plainly revealed, as the work of the Census Office had revealed it, he thought should give everybody cause for very great thought indeed. What was remarkable was not that our material production was great, but that it was so small. The Paper reminded them that in trades familiar to them the product of the country was extremely small. The whole of a year's product of wooden furniture and upholstery, for example, after adding a percentage for retail distribution, and taking into account not only furniture for homes but for offices, &c., was something like 10 millions at retail prices, not factory prices. That was adding about one-third for the cost of distribution. That was an extraordinary fact, and that and other facts showed them how they could use the Paper to arrive not at what the payment of their people was in terms of money, but what it was in terms of goods—how many goods they were paid, what they were paid in food, what they were paid in housing, what they were paid in the furnishing of houses, and so on. Another point arising in that section was, how far the national dividend was capable of transformation, without diminution, by social change. If they took, as they were doing in the forthcoming year, 13 millions chiefly from the income-tax paying classes and transferred it to so many poor old people, what happened ? They took spending power from a limited number and gave that equivalent of spending power to a large



number. If they had left that spending power in the upper regions it would either have been invested or spent in certain ways. If they transferred it to the other end of the scale, it obviously would not be invested, because the old people could not afford to invest; it would be spent on the necessities of existence. Therefore, by that social act they did not increase, but they transmuted part of the national dividend; instead of its being expressed in certain things it was expressed in certain other things. Another point was the cost of retail distribution. He quite agreed with the figure Mr. Flux had suggested, because for some years he had been investigating the subject, and he had found whether they took cycles, hats, boots, or furniture, or whatever it was, if they translated factory price into retail shop price they had to add about one-third. A 9*l.* cycle at Coventry was a 12*l.* cycle in London; that was to say, there was a third on. So that every time one went into a shop to buy goods, 25 per cent. of what one paid was the difference between retail and factory prices. He hoped Sir George Paish would forgive him for slightly differing from him with regard to married women. He himself had not included married women in estimating the national dividend, and for the plain reason that they were not paid. It was true they slaved and drudged; it was true their work pulled the home together as nothing else could pull it together, but they were not paid, and the very fact that they were not paid was a very serious thing. It meant that what ought to be an income for one person became an income for three or four or five people. The question of the "family income" was involved in that. They had heard a good deal of it; because since he had published "Riches and Poverty" all sorts of apologies had been offered with regard to the small incomes of the poor, and in order to enlarge those poor incomes certain statisticians had said, "The family not only gets 25*s.* a week from the father, but also 5*s.* earned by the boy or girl." Of course it did; but that was not an excuse but an indictment, because the boy and girl ought not to be earning at all; they ought to be continuing their education. The tables on page 567 were of the deepest importance, he thought, and he was obliged to Mr. Flux for giving them in that illuminating form. In connection with the Census of Production, he had heard it stated in the House of Commons that it was impossible to pay a better wage to men, because the average net product, as revealed by the Census of Production, per man was only 100*l.* a year. That was so, but that was the average of all trades and all workers. Mr. Flux's table analysed the workers into men, boys, girls and women. Where the average net output was 75*l.* to 100*l.* they found there were no less than 800,000 boys, girls and women employed, as against 1,000,000 or so men. Taking the next line, 100*l.* to 125*l.*, they noticed directly they got over the 100*l.* line the males preponderated by a large number. In short, it was not true that British working men had an output worth only 100*l.* a year. Those who were in favour of the idea of the minimum wage in industry did not forget that. They urged that Trade Boards should be established which should deal with each industry on its merits, and establish a minimum wage

which should have proper regard to the productivity of each particular industry. Mr. Flux had brought out the variability of employment extremely well in the Paper, and that was another matter on which the Census was going to give them increasing information. When they found, as they did, in an industry which had a certain general product, like the building industry, it was possible to employ salaried earners with fair regularity, while the wage earners were employed with extraordinary irregularity, they were faced with a social problem which demanded their close attention. The railway industry did not employ men like that. It was true that railway work was not so irregular as the building industry, but it experienced very great fluctuations. Of course, production was the only possible stable basis for such a country as ours, and therefore they had very gravely to consider whether their production was great enough, whether the figure which Mr. Flux had mentioned for the industrial capital was big enough, and whether they were doing all they possibly could with their natural resources. The United Kingdom was really a poor country, with few assets, the chief of which was coal; but that was such an enormous asset that it was questionable whether by this period of development in their economic history they ought not to secure a larger production than was shown in the Paper. The extraordinary progress of invention, the extraordinary facilities with which common goods could be produced by machinery, in his opinion, by this time should have given them a larger output of goods than was enjoyed at the present time. The chief lesson of the Paper was not only that there was an unequal distribution of wealth in the United Kingdom, but that the wealth produced was not large enough, so that, even if it were evenly distributed, it was not enough to raise to a high standard of living the whole population. So that they had not only an "error of distribution," as he had once called it, to deal with, but also an "error of production." If Mr. Flux's great work helped the nation to think gravely on these things, and to arrive at a better industrial organization and development, it would be one of the best things ever done, not only for the science of statistics, but for the welfare of the country at large.

Mr. H. L. SYMONDS (Chairman of the Manufacturers' Section of the London Chamber of Commerce) said one of the most valuable parts of the Paper was to be found in the appendix, in which the product of all the trades was set out from the lowest to the highest in progressive form. This, he believed, was an addition to the tables in the Census of Production Report, and it seemed to him an extremely valuable one, because it was absolutely essential to the knowledge of the truth of the comparative prosperity of the various industries that they should know how much capital (or, in other words, accumulations of labour) was invested in each particular trade; while the results given, varying from 10*l.* to 300*l.*, as Mr. Flux had rightly pointed out, provided not only the remuneration for the labour but the return for the capital. He thought if even a very small return were taken away as that which was rightly due

to capital, in many trades it would be shown that the remuneration of the labour employed was most beggarly. He thought it behoved all manufacturers to consider the desirability of seeing whether they could not do something to check the internecine competition which was largely responsible for the terrible and unnecessary reduction in the amount of the yield as a whole. He believed it was the Prime Minister who once said that "competition was often fratricidal in intention, but suicidal in effect"; and if they could do something to modify this they would have achieved a great deal. Another important point was whether they did not waste a great deal too much in the methods of transport and distribution of products. He was inclined to think it was on that side that probably the greatest possibility of further increase in riches could be looked for.

Mr. E. A. H. JAY said that Mr. Chiozza Money had referred to the fact that production was not as great as it ought to be. They always understood that the introduction of machinery would naturally result in a considerable increase in production; but in order to be satisfactory from the point of view of the workmen that increase must be very large indeed. It appeared from the Paper that in factories the output per head was very much larger than in workshops. From one point of view that was a good thing, because the cost of production was reduced; but it also meant that the number employed must be smaller, and it seemed to be quite clear that the introduction of machinery had resulted in human skill being employed to a much smaller extent than hitherto. At any rate, even if it could be shown that the total number employed had increased, human skill was not employed to the same extent. If the introduction of machinery had not resulted in a considerably larger production generally, it seemed to him to have produced a very difficult state of things. He cited the instance of the Port of London building new docks on the Thames, an enterprise which he said had caused a very great demand for additional labour, but which had been recently checked considerably by the introduction of a machine known as the "German Navy," which was going to do work that would have occupied some 200 men. That very largely reduced the number employed. But if production was not going to be very greatly increased by such inventions, it seemed to him that in the future comparatively few men would be able to earn a decent wage, because less and less skill was required, even if they were employed at all, a large proportion being only required to tend a machine. He asked the reader of the Paper to give his view as to what was likely to be the result of the process of development which was now apparent.

Mr. MACROSTY said that Sir George Paish and Mr. Chiozza Money had cast upon the Census of Production Office in taking the Second Census tasks which were immensely heavier than the extremely heavy task which was taken during the First Census; because Sir George Paish wanted the Census Office to collect

information with regard to the cost of transportation and distribution. Mr. Money had echoed the same desire, and both had indicated a strong wish that they should get closer information as to the industrial capital of the country. It was most desirable to get those things; but a Government Department could only get that information which it was empowered to get, and Mr. Money would remember that the powers which were conferred on the Census of Production Office were very strictly limited by the Parliament which passed the Act, and of which he was a distinguished member. So that before they got any of that information, further powers would have to be given to the Census of Production Office. Those people who wished Government Departments to do things should say very clearly what they wanted them to get. It was very simple to say: ascertain from the manufacturers themselves what is their capital. But what was their capital? One could turn up the Stock Exchange Year Book and get the face value of a company, or one could turn up the prices of the day and get its market value; but what about its secret reserve and its depreciation fund? Were its reserve and its depreciation fund in its business, or were they invested in outside securities? Were those industrial securities part of the capital of other firms which was being returned? It was extraordinarily difficult to frame a questionnaire, the answers to which would enable them to get correct information in the case of any one firm. It would be rather difficult to frame such a questionnaire at all, and still more difficult to frame it in a way which would not lead to the risk of its being unintelligible to the people who had to fill it up. He suggested that the estimates which had been put into the Final Report of the Census with regard to the addition to factory values in order to arrive at the final retail prices, and the calculation which had been made as to the industrial capital of the country, were not very far wrong, and the reason was that they fitted in with everything else. Those calculations were not made in a hurry. He thought Mr. Flux would remember they were at work on them for a very large portion of six months, making inquiries. They had to ransack every source of information, official and unofficial, which was known to them, and in the case of the capital they finally checked it off by comparing the figures with the figures which were published for the United States Census of Production. They had another element of control in the ascertained value of the production of goods for capital uses which was recorded in the Census, and they found that their calculated figures and the returned figures of the United States were in the same order of magnitude. They might be able to shift that 1,400 to 1,600 millions by 100 millions or so one way or the other, but they were not going to make it up to 2,400 or 2,600. He had nothing to do with the deductions that were to be drawn from that, as to whether it was good enough or not. He was exceedingly pleased to hear that Mr. Chiozza Money, who had devoted so much attention to the subject, confirmed the estimates which they had finally decided upon as to the addition to be added to factory values in order to arrive at retail prices.

Mr. W. M. ACWORTH asked on what lines the division between production, or transport and distribution, as the case might be, and services was made. They all knew a weaver was a producer, but what was an overlooker? They knew that a goods loader was a transport worker; what was a goods checker? And if a goods checker still came in as a transport worker, what about the invoice clerk in the room upstairs? He asked whether Mr. Flux could give any proper definition of the line that was drawn between the hand workers and the men at the top, and state on what principle it was drawn. One could imagine the clerk of a produce broker being treated in one way and a clerk in a Stock Exchange office in another way.

Mr. J. C. STAMP said they felt that Mr. Flux had added very much to their knowledge by the fine summary he had made at the beginning of the official report, and it was splendidly supplemented by the Paper that evening. He thought that Mr. Macrosty ought to be included in their congratulations, as he had had so much to do with the matter. With regard to the broad result which had been brought out by the comparison of industries using machinery with those not using machinery, before they jumped to conclusions they must remember it was an unfinished sum, and although a strong probability had been pointed out, they must remember that in the net output in the case of machinery very considerable allowances had to be made. It would be very useful if they could calculate the real amount per head for each group. There was an amount to be taken out of the net output for depreciation of machinery and all the allowances for the special items that machinery entailed, even including the extra rent of the building used. They ought to dissect the wages and take out the wages of those who looked after machinery, boilers, and so on, distinguishing those who did actual manufacturing work, before they came to general conclusions about the relative wages. He did not quibble about the general conclusion, but he wished to point out that it was not absolutely proved. It was perfectly true that the greatest value of the Census would be revealed when they had a succession of them and were able to test the results in relation to the time element and to see the relative shifting of the parts. It was perfectly clear from Mr. Flux's Paper, and the various remarks that had been made, that there was an immense field for investigation open merely on the statistical aggregates; but he put in a plea on a question which had not been touched, viz., the sectional use of figures by individual persons interested in individual trades. In the case of a manufacturer who was good enough to answer the questions put to him, who, when the official report came out, wanted to see how he stood in relation to the aggregate of which he formed the part, he would like to see something set forth more clearly than they had at present to enable him to compare the various parallel items of his accounts with the items in the official report. They knew that all industries did not make up their trading and profit and loss accounts in the same way. Some put one item into one, and others put it into

another, while others, again, made up only one account. But it was possible, after he had steered his way through all the remarks, to take off the necessary expenses—for instance, the cost of coal from one account, and add that to the cost of materials before arriving at his gross profit; and he would then compare his gross profit with the net output. It should be noticed that by the method adopted in the Census of Production the final stock, and not the initial stock, was included in the sales of the year, but it was valued at sale prices, whereas in general the trading account considered stock always at cost, so that the effect on the net output was to include the unrealised profit on the difference between the stocks. If they took an account in which there was material difference between the opening stock and the final stock, they would find, working out on the lines of the Census the net output on that particular account, that they had an unrealised profit on that difference in stocks. The manufacturer of course did not count his chickens until they were hatched, but the net output of the Census of Production had that effect. The value of the figures for gross output seemed to him, after handling it in a practical form in connection with a great number of accounts, to be in the inverse ratio to the complexity of the industry. Directly they got a simple industry that had not a great deal of differentiation in its processes, the gross output was comparable with the gross sales plus stock of that concern. He thought it was a great pity that the Census of Production did not give amongst its other details the number of schedules or concerns in each section, so that anyone could see what was the average figure under each column. It was perfectly clear that it would be impossible to divide it up in many industries because of the revelation of independent details; but surely for the great industries it would be possible to say how many concerns there were, and the individual manufacturer could say whether he was what Dr. Marshall called a representative firm, or whether big or small. He knew that the proportion between the different columns was not altered—it was the same in the aggregate as it would be if divided by that unknown figure—and he was still able to divide his accounts to see whether he had the average net output, and whether his cost of coal and materials was larger and how he differed from what the representative one would be. But in using aggregate accounts and aggregate results for that most fascinating of all the problems—that was, what the actual profit was out of the net output—one must be very careful how one handled that mysterious thing the gross output, which could only be used with the greatest reservation. However, they were very thankful to find that the net output could be added, divided, cut up, and everything else done with it, but that they did not destroy its utility and excellence.

Mr. W. T. LAYTON asked with reference to the figure of 210 millions which was added as the output of the agricultural and fishery industries, whether Mr. Flux regarded that as being on precisely the same basis as the figure of net output for manufacturers.

If it were so, it seemed to him to be a very large figure, considerably larger than one expected from the returns issued by the Board of Agriculture; and it seemed to give a very large output per person considering the level of wages of agricultural labourers shown by the Earnings and Hours Enquiry of the Board of Trade, and such estimates of rent and farmer's profits as could be deduced from existing statistics.

Mr. YULE said that in view of his own Paper six years ago, he wished, before the discussion was closed, to congratulate Mr. Flux on the completion of the Census, the issue of his Report, and the writing of such an extremely interesting supplement to that Report. He would like to direct attention to the long paragraph on pp. 558, which he thought contained some of the most useful warnings that had been given. He did not think many of them had completely realised the source of the differences between some of the earlier preliminary reports and the final report, and it was very useful to have the full explanation put on record. The various tables respecting net output per head had considerably surprised him. The figures seemed astonishingly low: it was a striking fact, given on p. 563, that over  $3\frac{1}{2}$  millions were engaged in trades in which the average output was below 100*l.* per head, and  $2\frac{3}{4}$  millions only with a net output over that limit, or again, as shown on p. 570, that 51 per cent. of the employees in England and Wales, 57 per cent. in Scotland, and 82 per cent. in Ireland, lay in the three lowest grades—that was to say, the grades in which the output was under 100*l.* per head. Even deducting the lowest grade in which many of the trades might be seasonal, and the figure did not represent the complete annual output, the proportion in those lowest grades was very large indeed. The paragraph respecting the coal raised and the coal consumed interested him, and he had turned to the Paper by Mr. Price Williams which was read before the Society in 1889, as he had some recollection that Mr. Williams had formed an estimate of the domestic consumption of coal, and he wondered how that estimate compared with the estimate framed on the present basis. Mr. Price Williams did not seem to take into account the special consumption of coal in mercantile establishments; apparently he included it with consumption for “domestic purposes.” His estimate was that the consumption was only 17·4 per cent. of the total raised. On Mr. Flux's calculation it came to over 23 per cent., and it looked as if Mr. Price Williams had under-estimated the domestic consumption as he had also, and admittedly, considerably over-estimated the consumption on coastwise steamers. He confessed, in connection with the tables regarding the output per head, that he a little regretted the exclusion from the scope of the Census of the question respecting the total amount of wages paid. That was a question which was included in the Census of the United States and Canada, and in the Bill that was originally drafted there was a requirement as regards that head. But that requirement had been finally omitted by the Standing Committee as a result of agreement between both parties. Had they had such information,

it seemed to him it would have been possible to get more meaning out of the table on p. 567 respecting the number of boys, men, girls and women employed without having to conjecture coefficients for turning girls into women or boys into men. He would be glad if Mr. Flux would state, if he were free to do so, for what reason the building trades were to be excluded from the next Census. It was rather to be regretted that they would not have information on that rather important trade to follow the present Census. The exclusion of establishments employing five persons or less on the aggregate followed, he believed, the Canadian practice, and it would be interesting to see what proportion of establishments included in the present report would be eliminated when that was done. He did not think that the elimination would be of very serious disadvantage.

The CHAIRMAN said he wished to emphasise the last paragraph of the Paper, in which Mr. Flux invited the cordial co-operation of manufacturers, and stated that in this matter everything depended on the willingness of manufacturers to afford the information asked for. That invitation should receive the widest circulation, and all the support the Society could give it. Personally, he should like to adopt it for himself, because undoubtedly on the willingness of farmers to render returns entirely depended the calculations which it fell to the lot of his Department to make as regards the production of agriculture. He could not but feel inclined to envy, in one respect, the position of the Census of Production Office, for at any rate with all his difficulties, the Director had the compulsory powers of the Act to support him in his search for information.

Mr. FLUX, in reply, said that he had particularly wished to suggest to others that they might find many things worth looking for in the bulky report on the Census of Production, though there were certain classes of information which, for reasons that had been mentioned, had not been secured. As Mr. Stamp had suggested, the information relating to particular industries might have claimed attention, but he had deliberately confined himself to broader issues, deeming them to be of greater interest to the Society as a whole. Sir George Paish had suggested that the Census of Production showed a net output of 900,000,000*l.* sterling for 7,000,000 persons employed. He thought it was 700,000,000*l.* for 7,000,000, and, consequently, having 100*l.* a head, and something like 20,000,000 occupied persons, they did not get far away from the 2,000,000,000*l.* for the national income, even if they proceeded by that rough process of assuming a similar production of wealth per head to apply over the whole field of occupied persons to that which was revealed over that part of the field they had had to explore; so that there again they got close to that figure of 2,000,000,000*l.*, which almost became an obsession. Mr. Chiozza Money had suggested that the variability of employment for the wage earner was partly due to the regularity of the salary earner, or something of that kind. The substitution of a wage-earners' table for that relating to all employed



persons on p. 575 would, it was true, show greater variability in certain places, but the aggregate variability would be substantially the same as was shown for the aggregate of all employed. He did not think that Mr. Symonds quite meant what he conveyed to his mind when he spoke of the appendix to the Paper as being an addition to the Census of Production Report. It was not new information, it was only a re-arrangement. Throughout the Paper he had attempted to re-arrange the officially published data for certain specific purposes, and had not added any information to that which was contained in the Report. The matter was as available for any other student as for himself, and the appendix to his Paper could have been compiled by any other student from the pages of the blue-book. As had become clear in the course of the debate, the capital employed by manufacturers had not been returned to the Census Office, and it had been necessary to resort to estimates instead of compiling actual returns. Mr. Macrosty had sufficiently well indicated the difficulties that would have lain in their way if it had been their duty to extract from the manufacturers a return of their capital. He had endeavoured to picture the capital as a physical fact—the equipment of industry—and to value that physical equipment, provided to assist labour, at something like market prices. That was the kind of conception he had been trying to express in the aggregate figure for manufacturers capital contained in the General Report. He did not know that he would be prepared to assent to Mr. Jay's proposition that the introduction of machinery reduced the level of human skill. The construction of the elaborate machinery that was used in modern industry called for a very high degree of human skill, and the fact that so large a proportion of the total output of industry consisted of capital goods meant that a high level of human capacity was called for, and, further, it was not a very simple thing after all to run complicated machinery. It was true that some processes of using machinery were simply mechanical, but all of them were not, and he thought they would make a mistake in stating too low the capacity of a man who could control a complicated piece of machinery and keep it running sweetly and smoothly, and who, when it ceased to run sweetly and smoothly, was able to set it right again. It was rather a high order of capacity on the whole that was required to do that, and he was not inclined to belittle the demands of modern industry on the intelligence of those who had to conduct it, as compared with the earlier times. With reference to the question asked by Mr. Acworth as to line of division between the productive and distributive and other classes, he would try to indicate what had been done. On the production side everybody earned, whether he was a carter, or operated a mule or a loom, or was engaged in the counting house, had been included. Those who were occupied in any of the phases of transport and trading, whether they were railway labourers loading goods into a van, or railway clearing house clerks, were included in the distributive class. With reference to other services, there was a whole page devoted to their enumeration in the General Report. He would not attempt to read that, or even

summarise it ; but he thought a study of that page would show what was covered by the estimate for services. Some part of the service, rendered by lawyers, bankers, and some other classes, were services rendered directly to producing industries, and paid for out of the output of those industries. Allowance had been made for such services when making up the additional estimate for other services, so as to avoid counting the same thing twice. That kind of classification was, perhaps, a little difficult to express briefly, but he hoped he had managed to convey the general lines of thought that they had endeavoured to follow out. The total of 210,000,000*l.* given for agriculture was estimated to be roughly on the same basis as the net output for manufacture. Mr. Rew could speak to that better than he could, but he thought the way in which it was made up was shown on page 24 of the Report, and from that it would be seen that it was based on the value of goods sold off the farm. Allowance was necessary for manures brought on to the farm to maintain its fertility, and for machinery purchased and so on. The amount of output per head when they had deducted such items as these would not work out quite so high in comparison with the manufacturing output as Mr. Layton appeared to think. It had been suggested that the number of manufacturing establishments in the various industries should have been stated. The information readily available, namely, the number of Returns tabulated, would not be quite as illuminating as suggested. It did not mean the number of manufacturers there were in the country. Some manufacturers preferred to make separate returns for each of the establishments they maintained. Other manufacturers preferred to make a composite return for two or more establishments. A considerable amount of additional information, some of it not altogether easy to procure, would need to be published at the same time as the number of returns that were included on the tabulation sheets, if that number were to be at all useful. Although it looked as if it might be an instructive figure, he did not think it would be nearly as instructive as imagined, and that was one of the reasons it was not stated. So far as the Second Census was concerned, Mr. Yule had expressed regret that the building trade was not to be included. He would refer to page 761 of the Final Report, where it was stated that there were 118,000 schedules issued to the building and contracting trades for the First Census. Some 45,000 of them had been cancelled as duplicates, or as issued to persons no longer in business, the directories having been to some extent misleading, preserving in their columns firms which had ceased to exist or had moved to another address or had changed their name without changing their real identity. There were nearly 10,000 which were transferred to other trades, and only about 45,000 schedules were finally available for tabulation in the building and contracting trades. That indicated the amount of trouble presented in the First Census by these trades, and although he hoped it might be possible to see a way of getting over these troubles at some later Census, the figures given illustrated one important reason why the building and contracting trades had been excluded from the Second Census. But he repeated that their

exclusion from the Second Census did not prejudice any other census. It was only with regard to the Second Census that any decision had been taken. He thanked them for the way in which they had spoken about his Paper, but many of the remarks which had been made were applicable rather to the Report and to the Office over which he had the honour to preside, than to the Paper and to himself.

The following candidates were elected Fellows of the Society :—

C. N. Bell.  
W. Collard.  
J. Kitchin.

G. H. Pownall.  
Miss D. M. Zimmern.