



An Interpretation of Certain Statistical Evidence of Concentration of Wealth

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Reviewed work(s):

Source: *Publications of the American Statistical Association*, Vol. 11, No. 81 (Mar., 1908), pp. 27-55

Published by: [American Statistical Association](#)

Stable URL: <http://www.jstor.org/stable/2276007>

Accessed: 30/07/2012 13:52

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AN INTERPRETATION OF CERTAIN STATISTICAL
EVIDENCE OF CONCENTRATION OF WEALTH.

BY G. P. WATKINS, PH.D.

The growth of large fortunes, both in number and in size, is matter of common observation. It is so obvious a fact that we do not need statistics to prove it. In order to measure the strength of such a tendency, it is true, we need statistics, and statistics of such a kind as are very difficult to get.

That property is undergoing concentration seems to be a proper inference from the admitted fact of the growth of large fortunes. The assumption involved in this inference is that the amount of wealth possessed by the people as a whole remains about the same, or the same per capita. Under such circumstances, if there are more who have much property, then those who formerly had little must now have still less. The assumption needs only to be made explicit in order that the unsatisfactory basis of the inference as to concentration be evident.

That the increase in the absolute number of large fortunes along with a corresponding increase of population is of no significance is too obvious a fact to require more than passing mention. The significance of an increase of wealth more than in proportion to the increase of population (that is, an increase of per capita wealth) is not so readily perceived.

Per capita wealth is known to be increasing. If so, and if there be no change in the character of its distribution (that is, if there be no tendency either to concentration or to the opposite), large fortunes must be increasing proportionately along with small properties. As per capita wealth increases, even though there be no tendency to concentration, the number of men worth \$100,000 or \$1,000,000 or any other given absolute

amount should be expected also to increase. People ordinarily think of a "large fortune" as some more or less definite absolute amount. If the words be given this meaning, then increase of large fortunes evidently does *not* involve concentration of wealth. We should expect the number of large fortunes to increase not merely as population increases, but also on account of the increase of per capita wealth. Since per capita wealth has been increasing in the United States, we should expect the ratio of millionaires to population to increase. The fact that this ratio has increased does not prove concentration of wealth. For the same reason, neither does the fact that our greatest fortunes to-day are larger than were those of a generation ago.

We may look at the question in a different way. We may say that a man is rich when he has 100 times the average or per capita amount of property of his countrymen, and that he is very rich when he has 1,000 times the average property. According to this definition, if per capita wealth be \$500, any man who has as much as \$50,000 is rich. But, if per capita wealth be \$1,000, a man must have \$100,000 to be rich. This, I think, is the better way to define the "large fortune." The idea should be that of a *relative* quantity. Men's ideas of "middle" and "upper" economic classes are certainly relative. If we assume that the growth of large fortunes and the concentration of wealth go together, we must take the term in its relative signification. Ordinary usage is of course ambiguous, not being clearly thought out. Taking the phrase thus relatively, we find it is *not obvious* that "large fortunes" have increased in importance in the United States in the last one or two generations. It may be so. But it is not the kind of conclusion that can well be based upon mere observation. The proof of concentration of wealth is a difficult and technical statistical problem.

An obvious and apparently the usual method of interpreting statistics of fortunes or incomes classified by size is to compare the per cents. of number in the several classes at the different

dates and also the per cents. of property possessed by the several classes. An objection to such procedure is that the uppermost class has no upper boundary, though this criticism is met in part where per cents. of amount of property as well as of numbers of owners are used. To be complete, the scheme should also include a class without property; classes should be of comparatively small range. But there still remains the fundamental objection that such classes, as they have been used, are bounded by absolute and fixed amounts, while concentration is a fact of relation. The boundaries of the classes should themselves be relative numbers, and should change with the per capita of the total amount of fortunes. If wealth classes are to be employed, the dividing lines should be at multiples of some sort of an average.*

The essence of the following attempt to interpret statistics relating to concentration of wealth is its use of thoroughly relative criteria. Another important difference from usual methods of treatment consists in keeping this question as to concentration of wealth separate from the other and larger question as to the character and tendency of the distribution of incomes, including thus incomes from labor. Special attention is given also to the *peak* of the pyramid of fortunes. One reason for this—in addition to the peculiar interest of that aspect of the question which relates to the growth of great fortunes—is the difficulties met in trying to obtain tolerable statistics of small properties, as distinguished from small incomes.

To test for a tendency to concentration of wealth, probate and inheritance statistics are the best available material. There is an assumption involved in the use of such material. But it is a fair assumption that any considerable influence affecting the degree of concentration of wealth among the living will soon affect in the same direction the distribution of property in the estates of deceased persons. In other words, the errors are constant and do not affect tests of *tendency*.

* For an extended discussion of this rather technical subject of the method of measuring concentration of wealth, the reader is referred to articles by Messrs. Lorenz, Holmes, and Watkins, Publications American Statistical Association, Nos. 70, 71, 72.

The best evidence we have for the United States bearing on the question under consideration is certain probate statistics compiled by the Massachusetts Bureau of Statistics of Labor. Following are the important primary tables:—

PROBATES IN MASSACHUSETTS: NUMBER AND AMOUNTS, AND THEIR PERCENTAGE DISTRIBUTION, 1829-31.*

	Number.	Per Cent.	Amount.	Per Cent.
Under \$500	1,431	38.7	265,544	1.8
500- 1,000	463	12.5	339,008	2.3
1,000- 5,000	1,274	34.5	3,022,264	20.9
5,000- 10,000	295	8.0	2,005,832	13.8
10,000- 25,000	157	4.2	2,426,465	16.8
25,000- 50,000	42	1.1	1,477,132	10.2
50,000-100,000	25	.7	1,829,147	12.6
100,000-200,000	6	.3	805,464	21.6
300,000-400,000	2		640,063	
400,000-500,000	1		415,371	
500,000 and over	2		1,267,817	
			3,128,715	
Totals	3,698	100.0	14,494,107	100.0

Population in 1830, 610,408.

PROBATES IN MASSACHUSETTS: NUMBER AND AMOUNTS, AND THEIR PERCENTAGE DISTRIBUTION, 1859-61.†

	Number.	Per Cent.	Amount.	Per Cent.
Under \$500	1,485	21.5	346,650	.7
500- 1,000	960	13.9	697,132	1.3
1,000- 5,000	2,827	40.9	6,791,881	12.8
5,000- 10,000	797	11.5	5,506,369	10.3
10,000- 25,000	507	7.3	7,787,931	14.6
25,000- 50,000	168	2.4	5,859,918	11.0
50,000-100,000	92	1.3	6,389,261	12.0
100,000-200,000	52	1.2	6,703,226	37.3
200,000-300,000	18		4,275,242	
300,000-400,000	7		2,386,964	
400,000-500,000	3		1,423,568	
500,000 and over	6		5,088,652	
Totals	6,922	100.0	53,256,794	100.0

Population in 1860, 1,231,066.

* The absolute numbers are from the Twenty-fifth Annual Report of the Bureau of Statistics of Labor, Massachusetts, 1894, p. 265.

† *Ibid.*, p. 267.

PROBATES IN MASSACHUSETTS: NUMBER AND AMOUNTS, AND THEIR PERCENTAGE DISTRIBUTION, 1879-81.*

	Number.	Per Cent.	Amount.	Per Cent.
Under \$500	1,822	16.3	446,576	.3
500- 1,000	1,451	13.0	1,047,946	.8
1,000- 5,000	4,588	41.2	11,275,295	8.2
5,000- 10,000	1,421	12.7	9,930,540	7.2
10,000- 25,000	1,023	9.2	15,797,932	11.5
25,000- 50,000	410	3.7	13,934,412	10.1
50,000-100,000	218	2.0	15,368,430	11.2
100,000-200,000	111	1.9	15,499,848	50.7
200,000-300,000	37		8,872,930	
300,000-400,000	22		7,618,947	
400,000-500,000	10		4,383,422	
500,000 and over	29		33,197,981	
Totals	11,142	100.0	137,374,259	100.0

Population in 1880, 1,783,085.

PROBATES IN MASSACHUSETTS: NUMBER AND AMOUNTS, AND THEIR PERCENTAGE DISTRIBUTION, 1889-91.†

	Number.	Per Cent.	Amount.	Per Cent.
Under \$500	2,217	15.2	546,605	.3
500- 1,000	1,738	12.0	1,269,863	.8
1,000- 5,000	6,197	42.4	15,073,011	9.7
5,000- 10,000	1,969	13.5	13,732,143	8.8
10,000- 25,000	1,498	10.2	23,142,749	14.9
25,000- 50,000	480	3.3	16,615,001	10.7
50,000-100,000	265	1.8	18,488,782	11.9
100,000-200,000	134	1.6	18,309,688	42.9
200,000-300,000	45		11,191,055	
300,000-400,000	22		7,462,719	
400,000-500,000	13		5,885,293	
500,000 and over	30		23,841,879	
Totals	14,608	100.0	155,558,788	100.0

Population in 1890, 2,238,947.

* The absolute numbers are from the Twenty-fifth Annual Report of the Bureau of Statistics of Labor, Massachusetts, 1894, p. 267.

† *Ibid.*, p. 267.

In these statistics there is exhibited a notable tendency to an increased number of the larger fortunes. There were two estates of over half a million probated in the earliest three-year period, and 30 such probated sixty years later. Meanwhile population had increased 267 per cent. The estates above \$100,000 were 11 in number in the earliest period, and 244 in the latest. The wealth of the community certainly did not increase at such a rate. The greatest growth of riches, but chiefly in numbers of moderate fortunes, appears to have occurred in the thirty years preceding the Civil War. In the latest decade covered there appears a tendency to reverse the process. For the latest period there is a decline in the *relative* number of half-million dollar estates probated. The tendency to concentration doubtless began to produce marked effects earlier in Massachusetts than elsewhere, owing to its leadership in manufactures and its lack of capacity for agricultural expansion. Hence the tendency may well have worked itself out by 1880.

But let us consider these figures in their proper relation to the growth of per capita wealth. According to the United States Census, the "true valuation" of real and personal property in Massachusetts for several decades past was as follows:—

PER CAPITA WEALTH IN MASSACHUSETTS.	
<i>Year.</i>	<i>Amount</i>
1850	\$577
1860	662
1870	1,463
1880	1,471
1890	1,252
1900	1,554

The per capita wealth of the State thus declined noticeably between 1880 and 1890. The two sets of figures, probate and census, are in general agreement as regards the indication that the relatively large number of estates of half a million or more in 1880 was in part but an expression of the greater per capita wealth of the State in that and in the immediately preceding years, as compared with ten years later and with twenty years

earlier. If a thorough relative test were applied, the year 1880 would probably not stand out so prominently in this matter of concentration of wealth as it does when one uses fixed class boundaries or any method which involves definition of the large fortune absolutely.

If the character of the actual statistics permitted the plotting of a practicable curve indicating relative quantities (that is, percentages), comparison of the course of such curves for different sets of data would immediately indicate to the eye which set was characterized by greater concentration.* The pyramid of fortunes, however, is of such a nature as not to lend itself readily to such diagramming. It is significant of prevailing inequality that the attempt to construct the curves fails because of the disproportion between the flattened base of the pyramid and the elongated peak. The curves resemble a capital L with enormously elongated arms and so little thickness of the different parts that the eye can form no judgment of quantitative relations. This is explained by the fact that the curve of the distribution of property is hyperbolic in its general characteristics.† Quantities arranged in something like a hyperbolic series do not lend themselves readily to ordinary graphic representation.

But a hyperbola is very easily represented graphically if one will plot the logarithms of the numbers instead of the numbers themselves. Just what the degree of difference is between two series of numbers so compared is not obvious, at any rate

* This is Mr. Lorenz's proposed method in the article referred to above. It is significant that Mr. Lorenz uses hypothetical figures, and thus fails to perceive the limited practical value of the particular species of graphic method that he prefers. The value of my comment in this discussion is subject to a similar qualification.

† If the statistics dealt with were not concentrated upon round numbers, the hyperbolic nature of the distribution of estates would find expression in the position of the arithmetic average of the estates within each class; that is, it should in each case be near the geometrical mean between the limits of the class. The Massachusetts statistics conform to this rule almost without exception. The British statistics almost as regularly do not conform to it; that is, the arithmetic average of the estates within the class is usually considerably above the arithmetic mean between the approximate boundaries of the class. The difference is explained by the fact that the estates at the round number which marks the lower limit of the class are included in it in the Massachusetts figures and the upper limit is exclusive; while in the British figures the lower limit is exclusive, and the upper limit inclusive, and especially the lower limit marks the transition to a higher tax rate.

to one who is not a trained mathematician; but the *direction* of the difference is unmistakable, and the method of testing for concentration is, so far as the writer can see, not open to criticism. This is what is needed.*

In the comparison of the logarithmic curves used in the following diagrams the crucial point is their *slant*. The steeper of two curves is the one which expresses the greater concentration. The scale used to represent the size of fortunes plotted must of course be identical for different sets of figures. The distance used to represent the logarithm of a given number of fortunes must also be the same for the different series compared. In order to assist the eye in comparing slants, however, it is often well to shift this latter scale along its own length, for one or more terms of the comparison, so as to bring the curves together at some convenient point. This is done in the following diagrams. Hence the logarithmic scale across the bottom of the diagrams indicates the actual logarithms plotted only in the case of the full line curves. In the other curves the scale corresponds to the series of logarithms plus a constant amount. The curves of the same diagram are thus made to start from the bottom at approximately the same

* As compared with the rearrangement of the statistics by the method of relative class boundaries, which also meets the requirement of defining large and small and middling fortunes relatively (that is, as so many times the mean fortune), the method of plotting logarithms has decided advantages. Of most practical importance is the fact that the amount of calculation involved in the use of the former method is prohibitive. The convincingness of the results, furthermore, is lessened by the necessity of using certain mathematical assumptions in rearranging the statistics. These assumptions are based upon principles not different from those used above, but are less satisfactory in application because more depends upon the accuracy of the fundamental averages. These averages are likely to be especially affected by inaccuracy in the reporting of small estates. Of the available averages the median is intrinsically to be preferred, since to measure the tendency towards large fortunes by a method which rests upon the arithmetic average is to weigh them in a balance the lengths of the arms of which are very largely determined by the large fortunes themselves. But the median would probably be most affected by the error resulting from the inclusion of a large number of debtor estates in the statistics.

More summary methods of testing for concentration may be in principle equally correct with those used in this article, but they do not deal directly or mainly with the point of most general interest; that is, the growth of great fortunes. For a summary test nothing could be better, it seems to me, provided satisfactory data are available, than the comparison of the median and the average, of course, by the use of the *ratio* of their difference to their sum or to one or the other quantity as a base, in order to preserve that relativity which is the essence of any correct measure of concentration.

point, each point of a shifted curve being moved horizontally the same distance.

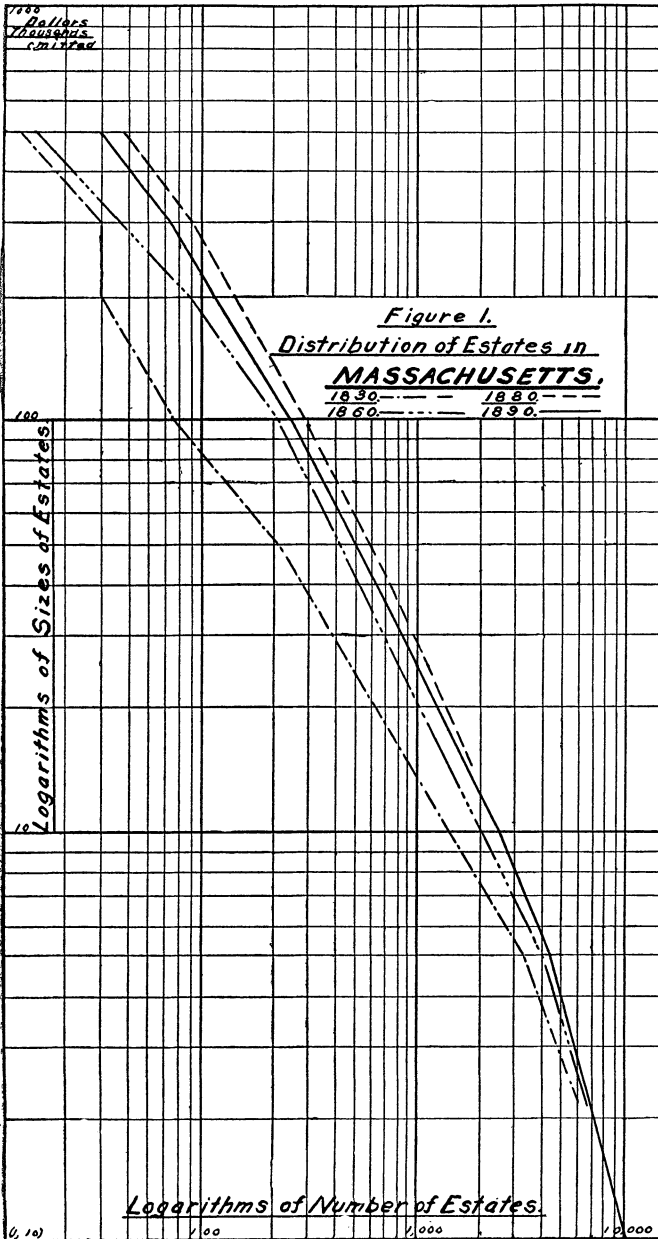
It is hardly necessary to add that, in judging these logarithmic curves by their comparative slant, the requirement of relativity in the test of concentration is fully and easily met.

The logarithms obtained for the above Massachusetts statistics, with the corresponding numbers, are as follows:—

Size of Estates, as large as	Log.	1830.		1860.		1880.		1890.	
		Number Estates.	Log.	Number Estates.	Log.	Number Estates.	Log.	Number Estates.	Log.
\$1,000 . . .	3.000	1,804	3.256	4,477	3.651	7,869	3.896	10,653	4.027
5,000 . . .	3.699	530	2.724	1,650	3.217	3,281	3.516	4,456	3.649
10,000 . . .	4.000	235	2.371	853	2.931	1,860	3.270	2,487	3.396
25,000 . . .	4.398	78	1.892	346	2.539	837	2.923	989	2.995
50,000 . . .	4.699	36	1.556	178	2.250	427	2.630	509	2.707
100,000 . . .	5.000	11	1.041	86	1.934	209	2.320	244	2.387
200,000 . . .	5.301	5	0.699	34	1.531	98	1.991	110	2.041
300,000 . . .	5.477	5	0.699	16	1.204	61	1.785	65	1.813
400,000 . . .	5.602	3	0.477	9	0.954	39	1.591	43	1.633
500,000 . . .	5.699	2	0.301	6	0.778	29	1.462	30	1.477

Plotting these data, we obtain the curves of Figure 1.*

* Where the lower part of another curve is not distinguishable from the curve for the statistics of latest date, it is discontinued. The numbers at the bottom of the diagram indicating the scale are those of the logarithms for the latest date. The measurement units are, of course, the same for the other sets of logarithms, but the scale is moved to the right a sufficient number of units to make the lower ends of all the curves coincide.



It is clear that there has been, in the period covered by these statistics, on the whole a pronounced tendency to concentration of wealth in Massachusetts. There was, however, a greater degree of concentration in 1880 than in 1890. The fact that the per capita wealth of Massachusetts in 1890 was less than in 1880 does not affect a test by the comparative slants of logarithmic curves. Neither does the omission of all reference to the propertyless affect in principle such a comparison. In the case of greater per capita wealth it is true one should be careful to allow determining points higher up on the curve to have their due influence on the judgment of slant.*

It is noticeable how closely these logarithmic curves approximate a straight line. A curve plotted thus by logarithms as a straight line is what is known to physicists and mathematicians as an adiabatic curve. The curve exhibits the relation between the pressure and the volume of a gas upon the assumption that it expands and contracts without either receiving or giving out heat. It is a general hyperbola.†

Probate reports do not furnish unimpeachable statistical material. But, as regards accuracy, it is only a constant ten-

* The writer has worked somewhat upon certain probate statistics of Maryland. Figures for Baltimore City, 1875 to 1880 inclusive, and 1888 to 1893 inclusive, and for the counties of Maryland, except Baltimore City, 1875 to 1879 inclusive, and 1890 to 1894 inclusive, are to be found in the Reports of the Bureau of Industrial Statistics of Maryland. They show a tendency to concentration for the State as a whole, though the statistics of Baltimore City by itself point slightly the other way.

† For the suggestion of the possibilities presented by the use of logarithmic curves for the purposes of this article, I am indebted to my colleague, Dr. F. R. Sharpe, of the Department of Mathematics, Cornell University. The same method is used by Pareto in his "Cours d'Économie Politique," vol. ii, p. 305, but for income curves. Pareto mentions the fact that the curve approximates a straight line. Mr. Lorenz's remarks about the logarithmic curve (pp. 216, 217) appear to be rather hasty. The "fixed classification" in the case of figures that are properly to be called statistics will have no effect on the steepness of the curve. It is true that the curve used above indicates nothing as to what may happen in the uppermost class; but can Mr. Lorenz's one multi-millionaire, however manipulated, form any basis for a statistical inference? The few cases at the very top must be treated separately if that appears necessary. Mr. Lorenz's suggested modification of the logarithmic method, which gives a place to the amount possessed by each class, has some advantages. Are they sufficient to outweigh added difficulties of visual interpretation? In any large body of reliable statistics, given the type of distribution as indicated, *e.g.*, by the numbers in the classes, the amount of wealth owned by each class will bear a known relation to its numbers, except possibly in the case of the highest and lowest classes. The amounts would be determinable by accepted principles of interpolation.

dency to errors of the same sort that seriously affects inferences drawn where the significant numbers are relative. The constant errors, moreover, are such as to reduce the appearance of concentration. There is a tendency to overstate the value of small estates on account of not allowing for debts. For large estates there is a presumption of understatement, perhaps from habits acquired relative to statements made with reference to assessment for taxation. If this last is true, the weight of the large and largest fortunes is greater than appears. In the test, by the comparative slant of logarithmic curves the effect of the most important sources of constant error may be evaded by disregarding the portion of the curve that represents the number of small estates. Probated estates are also to a degree misrepresentative of contemporary fortunes, since they were made in the past and are in larger proportion estates of inactive investors. But this error is also constant or else to some degree unfavorable to the inferences drawn.* Of other objections to basing conclusions on probate statistics, it may likewise be said, in general, either that they are constant and do not affect the inference as to tendency or that they are different in their incidence on estates in such a way as to give the large estates less apparent than real gain.†

A pertinent objection to inferences as to the growth of riches is that the fewness of the largest fortunes implies a large "probable error" in the conclusion. But this objection is of more force against attempts to measure degree of concentration than against the determination merely of the fact that there is a tendency in that direction. And the establishment of this fact does not depend on this one point in the evidence.

It is perhaps worth while to test the comparative width of distribution; that is, the proportion of propertied to propertyless classes. This can be done for comparative purposes by

* Has the adult death-rate among classes having property declined much in Massachusetts from 1830 to 1890? Only so far as such a decline has affected different economic classes differently would it affect inferences relating to concentration.

† Cf. Mayo-Smith, "Statistics and Economics," p. 434, and Ely's comment, "Evolution of Industrial Society," pp. 266, 267.

getting ratios of probates to population. These are, probates per 10,000 of population, in Massachusetts:—

1830 (approximately)	20.2
1860	“	18.8
1880	“	20.8
1890	“	21.7

No attempt is made to calculate the percentage of property owners to total population. The ratio of probates to population we should expect to increase, owing to the growth of savings institutions. A declining birth-rate or any other cause (*e.g.*, immigration) that tends to increase the proportion of adults in the total population would produce the same appearance. This phase of the question, touching the proportion of property owners in the population, is also most affected by inaccuracy in probate statistics, hence the symptoms exhibited among the property owners are more significant. Perhaps the most that can be inferred from the ratios just given is that there has been no important change in the relative number of probates such that it would give ground for a suspicion that the figures for different decades are not comparable.

The tendency to concentration, or to an increase in large fortunes, is a result of general causes operating throughout the western world. Evidence from other countries is important as supporting the conclusion from the statistics directly relating to the United States.

Probate statistics for Great Britain and Ireland follow:—

AMOUNT OF PERSONAL PROPERTY IN ESTATES SUBJECT TO PROBATE AND ADMINISTRATION
DUTIES IN THE UNITED KINGDOM, 1838.*

Size of (Personal) Estate.	Number.	Amount.
Under £1,000 †	18,316	£5,546,555
£1,000 to 10,000	6,006	18,275,500
10,000 to 25,000	685	10,427,750
25,000 to 50,000	216	7,050,000
50,000 to 75,000	53	3,095,000
75,000 to 100,000	30	2,580,000
100,000 to 500,000	35	5,712,500
500,000 to 1,000,000	2	1,200,000
1,000,000 and upwards	1	1,000,000
Totals	25,344	£54,887,305

Population of United Kingdom in 1838 (estimated), 25,905,194.

NUMBER AND NET CAPITAL VALUE OF ESTATES ASSESSED TO PROBATE DUTY IN THE UNITED
KINGDOM, CLASSIFIED BY SIZE, DURING THE 5-YEAR PERIOD 1884-85 TO 1888-89
(EXCLUSIVE OF PROPERTY ASSESSED TO CORPORATION DUTY).‡

	Class.	Number.	Amount.	
Of	£1,000 and under	£4,000 §	41,326	£86,069
"	4,000 " "	10,000	14,441	92,473
"	10,000 " "	50,000	10,145	214,303
"	50,000 " "	100,000	1,251	87,581
"	100,000 " "	500,000	737	138,959
"	500,000 " "	1,000,000	43	28,085
"	1,000,000 and upwards		12	20,811
Totals			67,955	668,281

Population in 1887 (estimated), 36,593,692.

* Data from Porter, "Progress of the Nation," 1843, vol. iii, pp. 131-133. There are errors in certain of his totals which are corrected in the above.

† The lowest class taxed is £20 to £100.

‡ United Kingdom Statistical Abstract, 41st number, p. 35.

§ Estates below £1,000 include estates below £300 at gross value, hence this class is omitted.

NUMBER AND NET CAPITAL VALUE OF ESTATES OR PORTIONS OF ESTATES LIABLE TO ESTATE DUTY IN THE UNITED KINGDOM, CLASSIFIED BY SIZE, FOR THE 5-YEAR PERIOD 1901-02 TO 1905-06.*

Class.			Number.	Amount.
Exceeding	£100 but not exceeding	£500	28,551	£13,069
"	500	" 1,000	49,136	41,131
"	1,000	" 10,000	81,140	298,441
"	10,000	" 25,000	11,221	203,973
"	25,000	" 50,000	4,500	175,188
"	50,000	" 75,000	1,403	95,852
"	75,000	" 100,000	699	65,026
"	100,000	" 150,000	649	85,812
"	150,000	" 250,000	427	92,089
"	250,000	" 500,000	246	93,075
"	500,000	" 1,000,000	99	77,437
"	1,000,000	28	84,608
Totals			178,099	£1,325,701

Population in 1904 was 42,793,272.†

The numbers for which logarithms are wanted, with their logarithms, follow:—

Size of Estates, as large as	Log.	1838.	
		Number Estates.	Log.
£1,000	3.000	7,028	3.847
10,000	4.000	1,022	3.009
25,000	4.398	337	2.528
50,000	4.699	121	2.083
75,000	4.875	68	1.833
100,000	5.000	38	1.580
500,000	5.699	3	0.477
1,000,000	6.000	1	0.000

* United Kingdom Statistical Abstract, 53d number, p. 45.

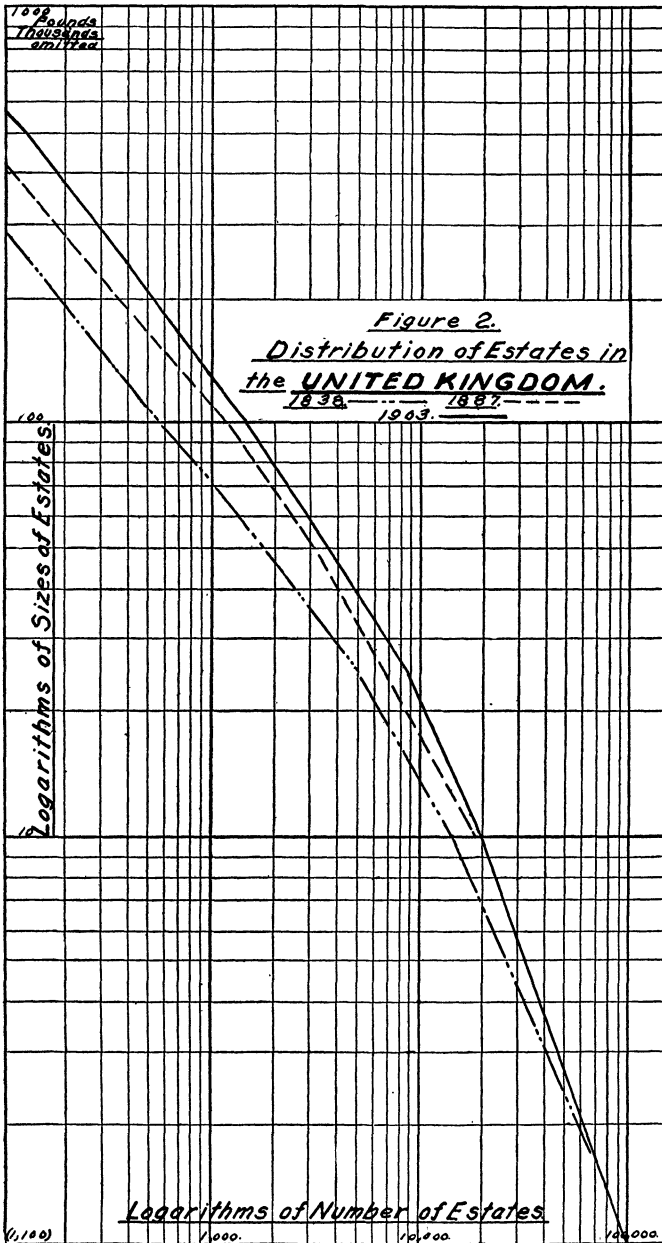
† *Ibid.*, p. 347.

Size of Estates, as large as	Log.	1884-85 to 1888-89.	
		Number Estates.	Log.
£1,000	3.000	67,355	4.832
4,000	3.602	26,629	4.425
10,000	4.000	12,188	4.086
50,000	4.699	2,043	3.310
100,000	5.000	792	2.899
500,000	5.699	55	1.740
1,000,000	6.000	12	1.079

Size of Estates, as large as	Log.	1901-02 to 1905-06.	
		Number Estates.	Log.
£100	2.000	178,099	5.251
500	2.699	149,548	5.175
1,000	3.000	100,412	5.002
10,000	4.000	19,272	4.285
25,000	4.398	8,051	3.906
50,000	4.699	3,551	3.550
75,000	4.875	2,148	3.332
100,000	5.000	1,449	3.161
150,000	5.176	800	2.903
250,000	5.398	373	2.572
500,000	5.699	127	2.104
1,000,000	6.000	28	1.447

Plotting these logarithmic quantities as curves, we obtain the results exhibited in Figure 2.*

* See foot-note to Figure 1.



These figures are not exactly comparable for the successive periods covered. Those for 1838 relate only to personalty. The same is true of the figures for 1884–85 to 1888–89,* which are therefore comparable with those of 1838. Changes in the law in 1889, followed by simplification and systematization in 1894, extended the taxation so that realty is included in the figures of later date.† As indicated in the tables above, there is a difference between the figures for the earlier periods and for the latest period used as regards the method of classification; that is, estates at the lower boundary of the class are included and those at the upper limit not in the former case, while the lower boundary of the class is exclusive and the upper inclusive in the latest figures. This does not affect the validity of the results of testing for concentration by the slant of logarithmic curves. In practice, it is true, the tendency to concentrate estimates on round numbers might make a slight difference in the reliability of the indication from a comparison of figures employing classifications differing in this respect.

The figures for the latest period include all realty, and are in every way the most reliable and complete. The ownership of realty in England is, for historical reasons, notoriously concentrated, and the appearance of greatest concentration at the latest date might be due only to the previous inadequacy of the picture. But such an argument leaves little room for much decentralization in the ownership of real estate. And comparison of the figures for the two earlier periods shows—even after making allowance for evident irregularity and inaccuracy of the figures for 1838—an unmistakable tendency to concentration in the ownership of personalty, which has probably not been

* Exactly what effect the qualification “exclusive of property assessed to corporation duty” would have, I am unable to say; but Giffen uses figures resulting from the identical tax laws as comparable with Porter’s figures. See *Journal of the Statistical Society*, 1883, p. 614. The amount so exempted is inconsiderable.

† Bastable, “Finance,” 556, ff. Spahr (“Distribution of Wealth,” p. 16, ff.) is therefore mistaken in his assumption that the figures of 1892 are exclusively for personalty. Of the three sets of figures used, those for the latest period and for the intermediate period are net. Of the figures for 1838 Porter says (iii, p. 128), “The amounts are in many cases reduced by the payment of debts due from the deceased and by other charges upon their estates.” Does this mean that the figures are not net?

completely reversed in the latest period. In the United States the evidence is clear for a much greater degree of concentration in the ownership of personalty than of realty, and there is likely to be no absolute inconsistency as regards economic conditions in New York and in Great Britain. The tendency of personalty, too, is the tendency of three-fourths of the wealth of Great Britain.* The conclusion that there has been, on the whole, in the last half-century, a tendency to concentration in the ownership of wealth in the United Kingdom appears to be not presumptuous.†

An important question to be considered, however, before drawing any conclusion from the above figures is, What is the relation between the character of the distribution exhibited by a combination of two sets of figures and the character of the distribution of the original series thus added together? The addition in the present case is effected through the possessors of the two kinds of property being the same persons; that is, the people of the United Kingdom. If the distribution were in each case a mere chance distribution, and if there were thus no correlation between the causes of inequality in the two cases, the effect of summation would obviously be a levelling down of previously existing inequalities. Both of these suppositions, however, are contrary to fact in the case of the statistics before us. The inequalities are not the result of chance distribution, and the same set of forces which produces inequality in the ownership of the one kind of property produces the inequality in the other case. There is thus a positive correlation of the inequalities. Certainly, no negative correlation is to be expected, such as would make the inequalities cancel each other, implying that those who possess little personalty possess much realty and *vice versa*.

Suppose, then, that there is correlation between the in-

* These facts are dealt with by the writer in a study of the economic causes of the growth of great fortunes recently published by the American Economic Association. See "The Growth of Large Fortunes," p. 49.

† Porter, in 1851 (*Journal of the Statistical Society*, p. 198), compiled figures which appear to show conclusively that there was no tendency to concentration in the ownership of personalty between 1833 and 1848.

equalities and that it is positive in its nature. Suppose, also, that the inequalities are about the same in each case, that is, that the shares in each case are corresponding proportions of the total amount distributed. Then, according to the mathematics applicable to this situation, if the positive correlation is perfect and if the inequalities are the same, the inequality resulting from summation will also be the same as the original inequalities. But, if the correlation be not quite perfect, the result of summation must be lessened inequality. If the inequality be greater in one case than in the other, and if the correlation be perfect, then the resulting inequality will be intermediate. But, *if the correlation of the original inequalities is imperfect, the resulting inequality is likely to be less than either of these original inequalities*, even though they differ considerably. This last is the case of the statistics of the United Kingdom with which we are dealing.

Though it is open to question, it may be that there is a greater inequality in the distribution of landed property in the figures for the United Kingdom than of personalty. Even so, summation of the two kinds of property would probably not produce an appearance of greater inequality than that exhibited in the distribution of the personalty by itself. The greater weight of personalty in the total of the wealth involved supports the inference that a possible greater concentration in the ownership of realty is probably not responsible for the difference between the latest figures and the others. It is highly probable, therefore, that the greater concentration at the later date is due to an actual tendency in that direction rather than to a difference in the inclusiveness of the statistics. If the appearance were the other way, the validity of an inference would be much more open to question.*

Recently counteracting factors may have been working to produce less concentration. The most recent American figures

* The period since the adoption of the present tax laws is so short that no good test of tendency on this basis is possible. The figures for the four years immediately preceding those for the latest period used, these two sets being exactly comparable, give a slant to a logarithmic curve practically indistinguishable from the latest plotted. But there were in proportion a few less estates over £1,000,000 in the later than in the earlier period.

used are, as we have seen, somewhat ambiguous. Exemptions under Schedule A of the British income tax, moreover, point to a decided gain in the ownership of income-producing property by persons with small incomes.*

On the face of the figures it appears that there is greater concentration in Great Britain than in Massachusetts, since the slant of the curves drawn to the same scales is slightly greater in the former case than in the latter. Any positive conclusion from such a comparison, however, is defeated by the different nature of the statistics used, the British figures being tax statistics and net, the Massachusetts figures being mere probate statistics, influenced by no motive to check underestimation of large estates or overestimation of small debtor estates. Since the direction of the errors is of a kind to invalidate the natural inference, no positive inference can be drawn.

For France neither estates nor incomes appear to have been classified in official publications, with reference to size, long enough to make them available to test the operation of a tendency to concentration. Succession statistics are of long standing, but have only recently been classified by size. The figures for 1903 and 1904 subjoined indicate considerably less present concentration of riches in France than in the United Kingdom or than in the older and industrialized portions of the United States.† This is the general opinion as regards the sources and the distribution of French accumulations.

* This point is developed by the writer in the study above mentioned at p. 137.

† The difference is great enough to warrant an inference, even though the statistics are not exactly comparable, especially as the differences are such as tend to conceal the difference, the British figures including *inter vivos* gifts and the American figures being not net.

CLASSIFICATION OF SUCCESSIONS ACCORDING TO NET VALUE, 1903 AND 1904.*

			Number.	Per Cent.	Amount (000's omitted).	Per Cent.
From	1 to	500 francs . . .	241,097	31.5	63,380	.6
"	501 "	2,000 . . .	208,382	27.1	265,589	2.6
"	2,001 "	10,000 . . .	205,957	26.8	1,005,423	9.8
"	10,001 "	50,000 . . .	83,889	10.9	1,791,340	17.6
"	50,001 "	100,000 . . .	13,955	1.8	975,604	9.6
"	100,001 "	250,000 . . .	8,872	1.2	1,386,095	13.6
"	250,001 "	500,000 . . .	3,073	.4	1,078,960	10.6
"	500,001 "	1,000,000 . . .	1,430	.2	990,691	9.7
"	1,000,000 "	2,000,000 . . .	664	} 978	944,248	} 25.9
"	2,000,000 "	5 mil. . . .	242		712,739	
"	5 "	10	50		363,277	
"	10 "	50	18		319,315	
Upwards of		50	4		301,092	
Totals.			767,633	100	10,197,753	100

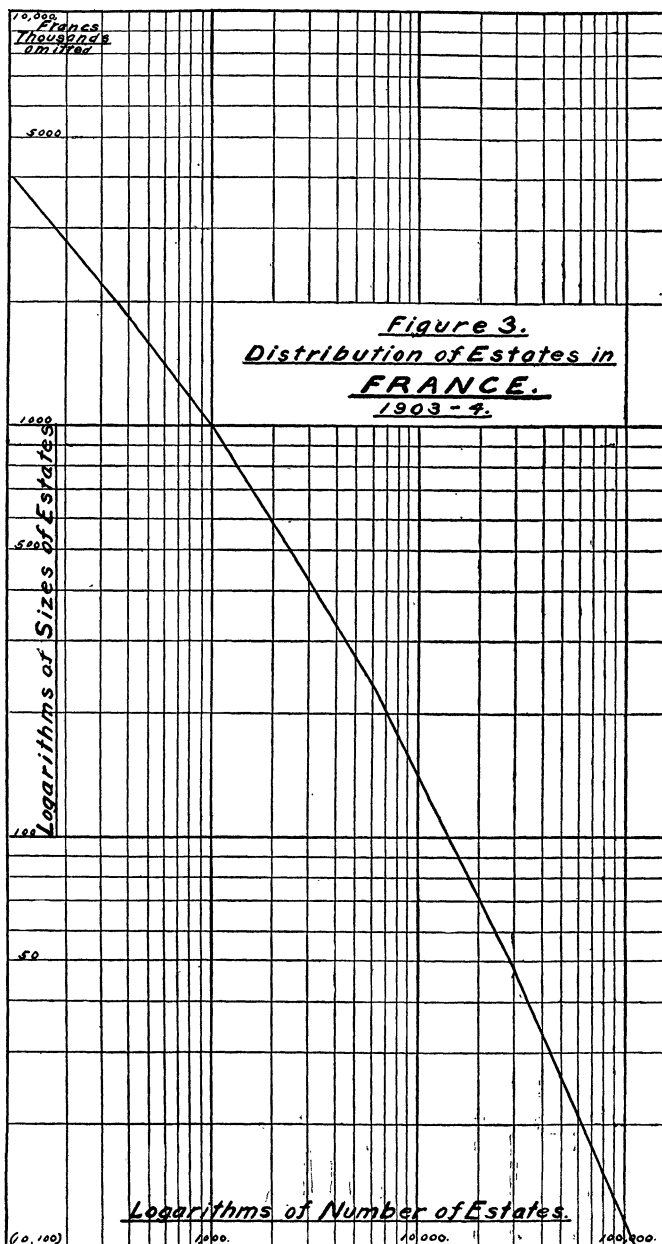
Population about 39,000,000.

The data for a logarithmic curve follow:—

Size of Estates, as large as	Log.	Number Estates.	Log.
501	2.700	526,536	5.721
2,001	3.301	318,154	5.503
10,001	4.000	112,197	5.050
50,001	4.699	28,308	4.452
100,001	5.000	14,353	4.157
250,001	5.398	5,481	3.739
500,001	5.699	2,408	3.382
1,000,000	6.000	978	2.990
2,000,000	6.301	314	2.497
5,000,000	6.699	72	1.857
10,000,000	7.000	22	1.342
50,000,000	7.699	4	0.602

These values are plotted in Figure 3.

* *Annuaire Statistique*, 1903, p. 285, and 1904, p. 231. In these two years the value of donations and successions together was 12,190.2 mil. francs, so the above statistics relate to five-sixths of the wealth of the country. See *Annuaire* for 1905, p. 78. The British figures include *inter vivos* gifts, I suppose as "portions of estates." They amount to much less than in France, as we should expect, on account of dotation and similar customs prevalent in the latter country.



Yet, if we may accept the conclusions of the French authority D'Avenel, there has been a pronounced tendency to concentration in France in the last century. His summary statement is, "The richest men of to-day are 6 times as rich or, comparing those of equal fortune, 12 times as numerous, as the richest personages of the old régime; they are 10 times as rich or 20 times as numerous as the richest princes of feudal times."* After making much allowance for the unrelativity of this proportion, the statement may be accepted as indicating tendency towards concentration.

The same authority estimates the number of persons in France with an income of 200,000 francs at 1,000.† There appear to be as many as 4,000 millionaires in the United States.‡ It appears, therefore, that we have, roughly, twice as many millionaires in proportion to population as France, though our per capita wealth is about the same.

For Germany it is necessary to test concentration and its tendency by other material than statistics of inheritances. The best available material is income statistics.

Income statistics show something besides concentration of wealth. But they may show that among other things. For the largest incomes may be considered to be due almost wholly to income from property. These large incomes from property are only the cap of a change which probably affects the pyramid of incomes from top to bottom in the direction of concentration. The growth of the salaried class, known from other evidence,§

* *Revue des Deux Mondes*, February, 1906, p. 861.

† *Ibid.*, p. 866.

‡ The New York *Tribune's* List of American Millionaires (1892) gives a few more than this. Though not of a nature to be quantitatively reliable, the estimate has been considerably used for want of something better. The Massachusetts probate figures indicate a corresponding number of millionaires, so the number 4,000 may be considered a fair though rough approximation, and rather an understatement for the present date.

§ A study of occupation statistics and other data throwing light on the growth of the salaried class is only indirectly important for the purposes of this article. Concentration of wealth and concentration of incomes are different matters. But, if the class of middling incomes is being reinforced by the growth of the salaried class, and if, nevertheless, that class is no more than, or barely more than, holding its own, as compared

accounts for the increased number of middling incomes. These cannot, therefore, be balanced against the increase of very large incomes. On the contrary, they seem rather to be taking the place of moderate propertied incomes. But, if the growth of very large incomes is enough to outweigh the growth of the

with the increase of large fortunes, this is a strong indication of concentration of property and of income from property.

There has been of late, in fact, a very noteworthy increase in the salaried class relative not only to the number of entrepreneurs, but also to the number of "wage-earners." For the tendency in manufactures we need only to cite the figures of the latest United States Census of Manufactures, that for 1905. In the five-year period 1900 to 1905 salaried officials, clerks, etc., increased in number 42.7%, while the number of wage-earners increased but 16.0%. In the German statistics of occupations the class of *Angestellte* corresponds to our "salaried officials, clerks, etc." The number of these at the dates given was as follows (the data are as given by Zahn, Conrad's *Handwörterbuch*, ii, p. 604):—

	1882.	1895.	Absolute Increase.	Per Cent. Increase.
Landwirtschaft . . .	66,644	96,173	29,529	44
Industrie	99,076	263,745	164,669	166
Handel	141,548	261,907	120,359	85
Ueberhaupt . . .	307,268	621,825	314,557	102

The increase in the total number of persons occupied was 17.80 per cent. Entrepreneurs employing assistants increased, in the period from 1882 to 1895, 1.3 per cent.; laborers, 62.6 per cent.; officials, 118.9 per cent. (Schmoller, "Grundriss," p. 436.) The salaried class is clearly gaining ground, though the propertied middle class is losing. The connection of both of these tendencies with modern industrial developments is obvious.

These statistics suggest a line of thought and investigation, which, however, does not promise readily to lead to a positive issue. If the question be asked, how far the growth of the "great industry" directly and positively favors the increase of the middle class—as some seem to think it does—the difficulties in the way of arriving at a convincing conclusion are many. If it would be necessary to know how the salaried class compares with the small-propertied class as regards economic condition, in particular how the different kinds of income, one kind being partly an income from goods, are to be weighted for comparison. Assuming that the two are to be accepted as equivalent middle classes, it would then be necessary to show that the salaried class was, as compared with the proportion of the small-propertied entrepreneurs to the total of those occupied in small-scale manufacturing, either a larger and not decreasing proportion of the total occupied in large-scale production or that it was as large a proportion and gaining ground. And, if the two members of the comparison are not constant in character, changes in their composition and income must be taken into account. The number of variables is not small.

The growth of the salaried class may yet be the means to the reinvigoration of a small or middle propertied class, owners, this time, of abstract property, that is, of bonds and other "securities." In power of saving, moderate incomes appear to have the advantage as regards subjective factors. On the objective side, too, in the field of investment, the evolution of abstract property appears to be putting the possessors of such income on the same plane with the possessors of large fortunes.

salary class, the evidence of concentration is clear and strong. Recently Adolf Wagner has worked over the later and very reliable Prussian income statistics, with results given in the following table:—

Size of Income (Marks).	Prussia: Per Cent. Distribution of Incomes.*					
	1892.		1896.		1902.	
	Numbers.	Amounts.	Numbers.	Amounts.	Numbers.	Amounts.
Up to 900 . . . (tax free)	78.18	41.21	76.88	40.03	70.66	32.97
900 to 3,000 . .	18.98	30.01	20.23	31.50	25.83	34.92
3,000 to 30,500 .	2.74	20.20	2.79	19.99	3.38	21.57
Over 30,500 . .	0.10	8.58	0.10	8.47	0.12	10.54

	Incomes in Prussia in †							
	1892.				1902.			
	Numbers.		Amounts.		Numbers.		Amounts.	
	Absolute.	Per Cent.	Mil. M.	Per Cent.	Absolute.	Per Cent.	Mil. M.	Per Cent.
900— 3,000	2,118,969	86.99	2,912	51.05	3,309,696	88.04	4,460	52.10
3,000— 6,000	204,544	8.40	832	14.59	291,341	7.75	1,179	13.77
6,000— 9,500	55,561	2.28	413	7.24	77,636	2.07	575	6.72
9,500— 30,500	46,092	1.89	715	12.54	64,737	1.72	1,001	11.69
30,500— 100,000	9,034	0.37	451	7.91	13,205	0.35	655	7.65
100,000— 500,000	1,555	0.06	277	4.86	2,594	0.07	485	5.67
500,000—1,000,000	72	0.003	47	0.82	108	0.003	72	0.84
1,000,000—2,000,000	27	0.001	37	0.65	44	0.001	64	0.75
Over 2,000,000	4	0.0002	20	0.35	16	0.0004	69	0.81
Total of above	2,435,858		5,704		3,759,377		8,560	
Tax free . . .	8,726,215		3,998		9,053,608		4,211	
Grand total . .	11,162,073		9,702		12,812,985		12,771	

* *Zeitsch. des Preuss. Statist. Bur.*, 1904, p. 255.

† *Ibid.*, p. 263. Like figures are given in the *Bul. Inst. Internat. de Statist.*, vol. xiv, Part III. Certain insignificant inconsistencies in the ratios above are in the original tables.

The gain of the class immediately above 900 marks in the ten years covered by the above statistics is very notable. The limit thus set for taxation is so low as to include not merely the salaried, but also some of the wage-labor class, which is also considerably increasing its income. Relative to all taxed incomes those of the middle classes are losing ground, despite the rapid increase of the salaried class. These statements are in terms of absolute income classes. But the average income is slightly lower at the later than at the earlier date, which makes a relative test not indispensable.* A comparison of the logarithms of the quantities involved of course rather strengthens the conclusion.†

The incomes taxed are unhomogeneous in character. It is impossible to separate incomes from labor from those from property, so as properly to weight the latter. The most exacting attention to the requirements of method cannot make up for these defects in the material. We can only refer to the known tendency towards an increase of the salaried classes, marked in Germany as elsewhere, and also, for these statistics, to the tendency towards higher money wages, as strengthening

* The facts that the average of incomes included is somewhat lower at the later than at the earlier date, and that the number included is a larger proportion of the population, suggest an increase of administrative efficiency. Which way this would affect the indications of the statistics as regards concentration, and how much, is a question. It looks as if there is no neglect of the smaller incomes. If increased adequacy is greatest here, the inference as to concentration is strengthened.

† Logarithms of numbers in income classes of 900 marks and above are:—

Size of Income as Large as	1892.		1902.	
	Numbers.	Log.	Numbers.	Log.
900 marks	2,435,858	6.387	3,759,377	6.575
3,000 "	316,889	5.501	449,681	5.653
6,000 "	112,345	5.050	158,340	5.200
9,500 "	56,784	4.754	80,704	4.907
30,500 "	10,692	4.029	15,967	4.203
100,000 "	1,858	3.269	2,762	3.441
1,000,000 "	103	2.013	168	2.225
2,000,000 "	31	1.491	60	1.778
	4	1.602	16	1.204

It is hardly necessary to plot these results.

the inference from the greater increase of the large incomes that there is concentration of *wealth*. It is these large incomes that are incomes from property. The actual fortunes are of course, if the interest rate is falling, increasing at a faster rate.

We should expect to find a reflection of the effects of the rapid industrialization of Germany in just these contemporary Prussian income statistics. The Berlin and Rhineland districts show the most pronounced tendency to concentration.* As regards the symptoms observable in other countries, pointing to a tendency toward a rehabilitation of the small-property class, such a tendency could hardly affect these statistics noticeably, and is perhaps less to be expected to show itself in Germany as yet on account of that country's being in an earlier stage of the abstract-property development.†

Only the most satisfactory bases of comparison and tests for the growth of fortunes have been used in the foregoing. Aside from lack of space, other methods, for example based upon statistics resulting from general property and house taxes and the like, are less accurate, as the data are even more impeachable than the above.

One point of general evidence, not of a statistical nature, may be added. Prices paid for curios and articles of luxury by the rich have enormously increased in the last two generations. Fine pictures and fine furniture, fine building sites and fine houses, have, wherever scarcity checks production and stimulates ambition, been bid up to astonishingly high prices. The buying of paintings of "old masters" and others by American

* See the article cited, *Bul. Inst. Internat.*

† British income statistics for Schedule D (that is, "profits from businesses, concerns, professions, employments," etc., classified by size) are often used as evidence of decreasing concentration of wealth (especially by Giffen and Goschen and by others following them). They show gains for middling incomes of the professional and salaried class, independent entrepreneurs, and the like. But they are not highly satisfactory material, since they are fractions of incomes, not the whole incomes of the persons entered (Report of Commissioners of Inland Revenue for 1902-03, p. 207), since they are also from the most unreliable of the schedules for accuracy (*Ibid.*, p. 173), and since they are affected by transfer into other classes (*Jour. Roy. Stat. Soc.*, 1888, p. 640). They are quite unsuited for our purposes, moreover, because the major portion of income from property, and especially abstract-property income, is entered under the other schedules.

millionaires in the last few years, at prices which competing European millionaires and princes could not afford to pay, is highly significant both of gratifying improvement in the ambitions of some of our multi-millionaires and of the fact that we possess the multi-millionaires.

The conclusion of this examination of the evidence relating to concentration of riches is: there has been, on the whole, in the last half-century or so, a tendency to concentration in the leading countries of the Occidental world. There appears to be more difference of opinion on this question than the evidence justifies, because the question of concentration of wealth is confused with that of concentration in the distribution of incomes. The poor are not getting poorer in the sense of receiving smaller incomes. Wages have demonstrably risen in the last half-century. But the concentration of wealth is a different question. Even in property the poor have, on the whole, probably gained absolutely. The question whether there has been enough rise in wages and salaries and enough absolute gain in property, both combined, to compensate or more than compensate for the relatively greater gains in property by the rich is irrelevant to our present purpose.

The situation, even when strictly confined to the question of concentration of wealth, is not without its encouraging features. The tendency is not so decisive, not even so unequivocal, as some would claim. Lately the small-propertyed class may have been gaining in weight, relatively as well as absolutely. Their saving power is such, and most recently their opportunities of investment have so improved, that their set-back is perhaps only temporary. In manufactures and the like, where the critical field is, industrial organization is adapting itself to subdivided ownership.

That there has been a general tendency to a disproportionate growth of large fortunes in the last half-century is clearly established. This we should expect as the primary though not necessarily the ultimate effect of the modern régime in industry.