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Railway Debenture Stock considered as a Security for the Investment of the Funds of a Life Assurance Society. By JOHN COLES, *Fellow of the Statistical Society and Fellow of the Institute of Actuaries.*

[Read before the Institute, 21st December, 1868.]

TWO valuable contributions to what may perhaps be called the "Finance of Life Assurance" appear in the *Assurance Magazine;* both by eminent Members of this Institute. The first in 1858 by our present President "On the Investments of the Funds of Assurance Companies;" the second in 1862 by Mr. A. H. Bailey, "On the Principles on which the Funds of Life Assurance Societies should be invested."

As these gentlemen have made no special allusion to Railway Debentures,* which now rank among the assets of so many Life Assurance Companies, I have ventured on the following remarks, though not without considerable hesitation, being well aware that the Members of this Institute generally are fully conversant with the subject. Yet the discussion which usually follows the reading of a paper of this kind may prove interesting to many, since the position of Railway Debentures* must be regarded as important, not only in reference to the investment of the funds of a Life

* Bonds and Stock.

Office, but to the public generally, who have invested upwards of one hundred millions in these securities.

The history of the infancy and growth of our great railway system is far beyond the proposed limits of this paper, as is also the almost equally wide question regarding the immense additions made from time to time to Railway Capital, particularly for "Extension Lines;" many of which have never yielded any adequate return: the latter point has but little in it to interest a debenture holder; it undoubtedly concerns however the holders of ordinary stock, and those who hold preference stocks contingent on the profits of a single year. The attention of those interested in this matter has now been thoroughly awakened, and we may rest assured that the future Capital expenditure, and general policy of Railway Companies will be much more narrowly watched than heretofore.

Like most subjects discussed in this room the one under consideration presents new features from time to time, arising from legislation or the unwritten law, which may be designated as Public Opinion. For example, legislation has lately enabled the Great Eastern Railway Company to bridge over a financial difficulty by authorizing the issue of a so-called "B Debenture Stock" which stands neither with debenture stock proper, nor with preference stock, but between the two—next public opinion has induced Railway Companies to commence in earnest the issue of debenture stock to pay off bonds falling due, thus converting an unfunded into a funded debt. To these subjects I shall again have occasion to refer.

A Debenture Bond, as is well known, is a promise to pay the amount advanced at an agreed rate of interest, usually at the end of a specified period, varying in practice from three to ten years. The special Act by which a Railway is incorporated sets forth the amount of Capital to be raised in Shares or Stock, and determines the limit of its borrowing power. The two general principles of limitation are—1st. That no Debentures shall be issued until the whole capital has been subscribed and a portion (usually one-half) actually paid. 2nd. That the amount borrowed on Debentures shall not exceed one-third of the Share Capital.

The usual form of a debenture bond is that of a mortgage deed, assigning as security for the loan "the undertaking tolls and sums of money arising under the special Act of Incorporation." The bond is transferable by deed only, duly stamped, the consideration money being stated therein, and the transfer registered at the Office of the Company within thirty days after its date (8 & 9 Vict., cap. 16).

Prior to the judgment of Lord Cairns in the early part of 1867 very incorrect ideas prevailed as to the legal position of the holders of debenture bonds.

That decision in the case Gardner *v.* London, Chatham and Dover Railway, clearly shewed that the holders of these bonds have simply the first claim on the tolls or net earnings of a railway without any power whatever to seize the fee-simple of the land on which the railway is constructed (or even the surplus lands or unpaid calls unless the bond be specially so drawn). In fact they cannot interfere with the carrying capabilities of what is regarded, when opened, as a common public highway, which any one has the right to use who will conform to the established regulations, and pay the Act of Parliament tolls.

In using the word "Debentures" I refer to both Debenture Bonds and Debenture Stock, which may be regarded respectively as the Unfunded and Funded debt of a Company; the rights and remedies in both securities, are very much alike: as a holder of either, could, through the Court of Chancery, appoint a "Receiver" in case of default; the Bondholder for Capital and Interest, and the Stockholder for Interest. The "Receiver" may be appointed under the 53rd and 54th Sections of the Company's Clauses Consolidation Act 1845, to "receive tolls, or sums liable to the payment of principal and interest," and he would act on behalf of all, as the Court of Chancery, guarding the public interests, will not allow an individual debenture holder to seize and appropriate the property to the payment of his own particular claim.

In the event of a "Receiver" being appointed there can be but little doubt that debenture bonds would rank according to the dates of the "Acts" under which they were issued, and all the debenture stockholders may have to rank after the bonds, unless they are specially protected, as in the case of the issue of One Million Debenture stock by the London and South-Western Company in 1862 when the "Act" authorizing the issue contained the following provisions—"That the dividends on the Debenture stock shall be guaranteed dividends, and shall have preference to and priority over all principal money and interest secured by mortgage of the Company from time to time after the passing of this Act, issued subsequently to the issue of the respective Debenture stock, and the effect of this provision shall be noticed in all the Mortgages of the Company so issued."

The litigation respecting priorities of rights in the "London, Chatham and Dover" suits will throw much light on the question and no doubt establish precedents as guides to the future.

The over issue of Debentures has it is to be hoped been effectually guarded against by the 29 and 30 Vict., cap. 108, which requires each Company to publish half-yearly, full particulars of its Debenture issue, stating how much has been authorized to be raised, and the sum that has been actually raised to the end of each half-year, specifying also the Act or Acts of Parliament under the powers of which the Company has contracted any Mortgage or Bond debt, or has issued any Debenture stock, also the amount remaining to be borrowed under such Act or Acts. Moreover the following Declaration has now to be appended to every Debenture Bond, and to every Certificate of Debenture Stock:—

"We the undersigned being two of the Directors of the Com-
" pany specially authorized and appointed for this purpose, and I
" the undersigned Registered Officer of the Company do hereby
" declare (each for himself) that [the within written Mortgage
" Deed is issued or] this Certificate is re-issued under the borrow-
" ing powers of the Company as registered on the . . . day of
" . . . . and is not in excess of the amount there stated as
" remaining to be borrowed, and of the amount of Bonds and
" Debenture stock included in that statement."

The above must be signed by two of the Directors and the Secretary, or Registered Officer of the Company.

Money borrowed by Railway Companies has generally been obtained with the idea of re-borrowing when the Bonds mature, without ever contemplating the final repayment of the Capital.

This re-borrowing has, in times of monetary pressure, proved to almost every Company a matter of anxiety and difficulty, so much so indeed as on one or two occasions to have placed great and important Companies in a condition almost of peril; which it may be hoped after the sharp lessons of 1866 and 1867, they will never be placed in again. If the Financial Crisis of that period proved one thing more clearly than another, it was that Debenture Bonds are altogether unsuited to Railway Companies. To mortgage a year's net tolls for maturing Bonds often equal to three or four times the amount of such tolls is obviously wrong, and the only remedy is the issue of Debenture Stock, the Interest on which a Company can readily meet.

In considering the question of safety of a Company's Debentures, the marketable value of the ordinary stock or the dividend paid thereon may be almost disregarded, as a large amount of preference stock may follow the debentures, and prevent any portion of the net revenue reaching the ordinary stock; for example, the first mortgagee of a freehold estate would be indifferent as to the income left to the mortgagor if he knew that the estate yielded sufficient to meet interest on a second mortgage for a large amount.

We may in like manner regard Debentures as the first mortgage, preference stocks as the second mortgage, and ordinary stock as the mortgagor.

The annexed Table No. 1 (abstracted from the last official accounts) will more fully illustrate this point, as it will be found on reference thereto, that after paying debenture stock and bonds, the "Great Western," with an aggregate capital of 46 millions, has to meet the interest on £17,300,317 preference stocks, before anything can reach the ordinary stock; whereas the "London and North-Western," with a total capital of 52 millions, has only £7,391,118 preference stocks to provide for.

On further inspection of this Table it may be remarked that the amount raised by Debentures appears to exceed in some instances the legal issue of one third of the remaining stock issued; but this is explained by the fact, that companies generally, except perhaps the Caledonian, do not state the capital of the leased lines which they work, though they avail themselves of the borrowing powers which those lines possessed prior to the lease.

In the year 1867 the total number of railway travellers, exclusive of season ticket holders, was 287 millions—one penny in the pound for Income Tax yields the Exchequer about one million and a half sterling, and in like manner one penny a passenger yields annually more than a million sterling to our Railways. It would perhaps be difficult to furnish a stronger illustration of the wonderful power and resources of these Companies.

At the end of last year the whole of the Railways in the United Kingdom had raised—by Debenture Stock and Bonds, £126,029,676; by Preferential Stocks, £143,209,357; and by ordinary Stock, £233,023,854. In the year 1867 all the Railways earned a net income of £19,631,047 (or 50 per cent of the gross receipts); therefore assuming the average interest paid on Debentures to have been $4\frac{1}{2}$ per cent, the sum required to pay the Debenture Stock and Bond holders would have been about £5,670,000, thus leaving a surplus net income of about £14,000,000 for the preferential and ordinary stocks.

TABLE No. 1.—*Railway Capital*, 1868.

Name of Company.	Debenture Bonds.	Debenture Stocks.	Preferential Stocks.	Ordinary Stocks.	Total.
Bristol and Exeter ..	891,200		1,882,729	2,022,460	4,796,389
Caledonian	4,828,028	541,591	11,508,124	4,734,434	21,612,177
Dublin and Belfast Junction	232,860	13,070		873,500	1,119,430
Dublin, Wicklow and Wexford	437,742		811,630	500,000	1,749,372
Glasgow and South-Western	1,453,351	51,893	1,405,452	3,756,437	6,667,133
Great Eastern......	*5,418,402	1,301,257	8,150,127	†9,201,021	24,070,807
Great Southern and Western (Ireland) .	403,920	164,914	1,329,100	4,111,889	6,009,823
Great Western	*12,964,108	3,727,343	17,300,317	12,548,481	46,540,249
Great Northern	1,332,458	2,853,729	6,364,829	7,788,697	18,339,713
Lancashire and Yorkshire	5,048,435	504,021	4,271,798	12,693,594	22,517,848
London aud South-Western	3,296,734	1,533,122	4,415,146	7,772,886	17,017,888
London and Brighton	2,787,072	1,305,744	7,226,034	6,839,882	18,158,732
London and North-Western	12,770,291	2,335,523	7,391,118	29,879,138	52,376,070
Manchester, Sheffield and Lincolnshire ..	*3,607,885	236,246	4,123,908	4,392,553	12,360,592
Metropolitan	*1,680,084		815,387	3,699,712	6,195,183
Midland	5,737,895	1,122,647	13,389,793	12,344,013	32,594,348
Midland and Great Western (Ireland) .	1,245,486	29,440	264,413	2,157,175	3,696,514
North-Eastern......	10,253,444	554,209	12,870,016	16,378,958	40,056,627
North London......	*779,441	7,100	700,000	1,682,080	3,168,621
North Staffordshire..	1,541,286		1,592,630	3,230,140	6,364,056
North British	*5,428,048	567,826	8,894,108	4,184,420	19,074,402
South-Eastern	*4,292,361	710,782	5,951,842	7,637,049	18,592,034
South Devon	529,225	130,860	576,010	1,498,300	2,734,395
Taff Vale..........	398,183	38,817	285,000	1,016,920	1,738,920
	87,357,939	17,730,134	121,519,511	160,943,739	387,551,323
	$\underbrace{\qquad\qquad\qquad}_{105,088,073}$				

I have confined the annexed Tables to the larger Lines, as the smaller ones scarcely come within the scope of many of my remarks, being more liable to fluctuations and other disadvantages, but it will be noticed that the 24 Companies enumerated in the Tables had at the end of last June raised on Debenture Stock and Bonds £105,088,073 out of the 126 millions shown by the most recent Parliamentary return to have been raised by the whole of the Railways in the United Kingdom at the end of last year.

Tables 2 and 3 show that the 24 Companies in question earned a net income in one year to June last of £16,746,625; and out of this sum they had to pay only £4,658,605 for interest on debenture stock and bonds (amounting to £105,088,073) or about $4\frac{1}{2}$ per cent, the average rate assumed above for all the railways.

* Includes temporary loans. † Includes East Anglian No. 2 Stock.

I therefore venture to affirm that if the issue of Debenture Stock be proceeded with, and the Bonds thereby extinguished, the future of railways may be regarded with the greatest satisfaction, and the annual charge to meet the interest thereon will continue to be so small when compared with the total Net Revenue, that the security of this Stock, especially that issued by the leading English lines, will at no distant date rank next only to Consols.

In arriving at the net revenue available for debenture interest, there is I think but one important question which may be considered at all doubtful—that is the legal position of Leased Lines as compared with Debentures. Their position must depend on the terms of the leases; but in most instances the Special Acts for leases give the lessors considerable power—as a common illustration, Act 28 Vict. C. c., authorizing the lease of the Blackwall Railway to the Great Eastern, empowers the lessors to "levy rent by distress and sale of goods and chattels" of the Great Eastern Company.

TABLE No. 2.—*Railway Net Revenue (after payment of working expenses and the Rents of Leased Lines).*

Name of Company.	Half year ending December, 1867.	Half year ending June, 1868.	Total Net Revenue one year to June, 1868.
Bristol and Exeter	105,311	97,834	203,145
Caledonian	*a* 383,841	370,643	754,484
Dublin and Belfast Junction	23,657	22,753	46,410
Dublin, Wicklow and Wexford	25,883	25,182	51,065
Glasgow and South-Western	*b* 157,093	151,333	308,426
Great Eastern	399,767	342,460	742,227
" Southern and Western (Ireland)	138,904	133,062	271,966
" Western	899,715	903,545	1,803,260
" Northern	531,643	412,888	944,531
Lancashire and Yorkshire	637,633	660,951	1,298,584
London and South-Western	416,779	365,545	782,324
" and Brighton	302,721	243,578	546,299
" and North-Western	1,501,946	1,285,601	2,787,547
Manchester and Sheffield	252,880	213,021	465,901
Metropolitan	*c* 141,410	*d* 149,584	290,994
Midland	726,961	702,804	1,429,765
Midland and Great Western (Ireland)	55,073	52,614	107,687
North-Eastern	1,022,913	898,733	1,921,646
" London	82,317	86,169	168,486
" Staffordshire	129,006	115,936	244,942
" British	288,504	288,353	576,857
South-Eastern	410,988	349,840	760,828
" Devon	56,657	43,764	100,421
Taff Vale	71,762	67,068	138,830
Totals	8,763,364	7,983,261	16,746,625

a. Not including £12,375 from Premium account.
b. Not including £3,000 from Premium account.
c. Includes £57,000 from the Contractor.
d. " " "

TABLE No. 3.—*Debenture Interest* (*Bonds and Stock*).

Name of Company.	Debenture Interest paid. Half Year to Dec., 1867.	Debenture Interest paid. Half Year to June, 1868.	Total paid for one Year to June, 1868.
Bristol and Exeter	19,100	20,616	39,716
Caledonian	118,104	123,243	241,347
Dublin and Belfast Junction	5,915	5,825	11,740
Dublin, Wicklow and Wexford	14,401	9,494	23,895
Glasgow and South-Western	34,234	34,313	68,547
Great Eastern	141,280	140,601	281,881
Great Southern and Western (Ireland)	13,089	13,462	26,551
Great Western	381,483	390,845	772,328
Great Northern	96,172	93,938	190,110
Lancashire and Yorkshire	118,731	119,710	238,441
London and South-Western	98,226	100,467	198,693
,, and Brighton	101,463	94,908	196,371
,, and North-Western	323,449	324,400	647,849
Manchester and Sheffield	82,780	88,105	170,885
Metropolitan	(*a*) 10,109	(*b*) 15,734	25,843
Midland	147,529	148,442	295,971
Midland and Great Western (Ireland)	19,134	19,358	38,492
North-Eastern	243,155	239,193	482,348
,, London	17,308	17,300	34,608
,, Staffordshire	35,596	36,596	72,192
,, British	152,686	156,946	309,632
South-Eastern	116,395	117,344	233,739
,, Devon	16,865	20,421	37,286
Taff Vale	10,046	10,090	20,136
Totals	2,317,250	2,341,351	4,658,601

(*a*) £10,109 Interest on Loans charged to Capital in addition.
(*b*) £24,486 Do. Do. Do.

Perhaps the most decided legislation on this subject—though it has a special, and by no means a general application—is contained in the London, Chatham and Dover Railway (Arrangement) Act, 1867, which sets forth in Clause 31, that "the income received "by the Board shall be applied to the following purposes in the "order specified: In payment of all working and incidental ex- "penses and of all Rates and Tithes and of all annual Rent-charges "payable by the Company, &c. . . . . and also of Rents or "sums in the nature of Rent from time to time payable to the "Sittingbourne and Sheerness Railway Company and the Mid Kent "Railway Company &c."

I am therefore of opinion that rents of leased lines must as a rule be paid before debentures, and I have made the necessary deductions prior to setting forth in Table No. 2 the net revenue available for debenture interest.

The Tables will prove how really secure are the Debentures of many Companies which have been lately regarded with doubt and distrust, such as the "Great Western," "Great Eastern," "Brighton," &c.

As the conversion of bonds into stock will doubtless continue, we may, when this operation is completed, consider that Company generally the strongest, which has the largest Net Revenue after paying Debenture Interest. The whole of the Companies may indeed for comparison be placed as I have arranged the largest of them in the Table No. 4, that is, in the order of the highest surplus of Net Revenue after payment of Debenture Interest, which appears to be a good test of each Company's capability to meet the interest on a funded debt, supposing the unfunded debt has ceased to exist. We must not however disregard the percentage column in this Table, which in many instances modifies the effect of a large surplus, by showing the proportion it bears to the debenture debt.* The case of a leased line may, in some instances, be an exception to this rule, some of these Companies still issuing their own debentures; and since they derive a fixed rental revenue, their position cannot be so liable to fluctuation as independent Companies which have about the same net income. In dealing with a leased line it is however always desirable to have regard to the position of the lessee and the "Act of Parliament" which authorized the lease. In like manner lines under a "working agreement" such as the "Staines, Wokingham and Woking," and the "Salisbury and Yeovil" require special consideration.

I have omitted to tabulate any figures regarding the "London, Chatham and Dover," which helped so much to swell the tide of distrust in 1866-7. It is however impossible at present to correctly apportion the capital, on account of the conflicting claims of the Debentures, the Common Fund Stock, the Western Extension Rent-charge, &c.

The Act of 1844 (cap. 85) authorizes the Lords of the Treasury—subject to the consent of Parliament—to purchase after 1865 any Railway constructed subsequent to the passing of that Act. Such a result would doubtless be very beneficial to Railway Securities, and the question has recently been much discussed, and no doubt will be more so owing to the purchase of the Telegraph Companies by the Government.

The most recent and by far most valuable railway legislation is Act 31 and 32 Vic., c. 119, which has reference to the publica-

* In only one instance in the Table will it be found that the Debenture Interest absorbs as much as 50 per cent of the amount available to meet it.

tion of uniform accounts by all the railways. This Act comes into operation at the end of this year, and contains clear and explicit schedules of the forms of accounts to be used in future. The only Company which has already adopted the new plan is the "Lancashire and Yorkshire."

Those who wish to analyze railway accounts will hereafter derive very great advantages from this Act. Uniformity in the method of presenting accounts may, I venture to think, be applied with equal advantage to other Public Companies, not excepting Assurance Companies.

TABLE No. 4.—*Railway Surplus Net Revenue after paying Interest on Debenture Bonds and Stock.*

Name of Company.	Year ending June, 1868.	Percentage of Surplus Income on Debenture Debt.
1. London and North Western	2,139,698	14·16
2. North Eastern	1,439,298	13·31
3. Midland	1,133,794	16·52
4. Lancashire and Yorkshire	1,060,143	19·09
5. Great Western	1,030,932	6·17
6. Great Northern	754,421	18·01
7. London and South-Western	583,631	12·08
8. South-Eastern	527,089	10·53
9. Caledonian	513,137	9·55
10. Great Eastern	460,346	6·85
11. London and Brighton	349,928	8·54
12. Manchester and Sheffield	295,016	7·67
13. North British	267,225	4·45
14. Metropolitan	265,151	15·18
15. Great Southern and Western (Ireland)..	245,415	43·14
16. Glasgow and South-Western	239,879	15·27
17. North Staffordshire	172,750	11·20
18. Bristol and Exeter	163,429	18·33
19. North London......................	133,878	17·02
20. Taff Vale..........................	118,694	27·16
21. Midland and Great Western (Ireland) ..	69,195	5·42
22. South Devon	63,135	9·56
23. Dublin and Belfast Junction	34,670	14·09
24. Dublin, Wicklow and Wexford........	27,170 *	6·20
Total......	12,088,024	
The corresponding Total for the year ending June, 1866, was........	12,475,175†	

* The following Railways also earned Surplus net incomes exceeding £25,000—Dublin and Drogheda, Furness, Highland, Monmouthshire.

† Including "Scottish North-Eastern," now incorporated with the "Caledonian;" and the "Vale of Neath," now part of the "Great Western."

In the foregoing remarks, and especially in setting forth the comparative strength of the various Companies in Table No. 4, for the guidance of those interested, I have had in view the probability that at no distant period the holders of Debenture Bonds will not have the option of renewing their Bonds, but will instead have the offer of Debenture Stock. Even at this moment some Companies which offer 4 per cent only on the renewal of Bonds, are willing to give $4\frac{1}{2}$ per cent on Debenture Stock; and the latter seems by far the most advantageous, as the extra half-per-cent appears more than sufficient to meet any depreciation which can possibly arise in the market value of the Stock. Already the public appreciation of the value of Debenture Stocks is shown by the fact that all the recent issues, over 4 per cent, by the leading lines, are at a premium.

For the investment of the funds of a Life Assurance Company, Debenture Stocks of the leading English Lines such as the first ten or twelve in Table No. 4 appear to offer the following advantages:—

1st. They afford undoubted security for the due payment of interest.

2nd. They yield a fair average rate of interest (say from 4 to $4\frac{3}{4}$ per cent).

3rd. They are readily marketable.

4th. They are as a whole less liable to fluctuation than government securities.

It is however quite necessary that gentlemen having in their hands the investment of the funds of Assurance and other Companies should watch the course of railway legislation, especially in reference to the issue of stock bearing the title of Debenture Stock, but which may really have no claim whatever to that designation, as commonly understood; for example, the Great Eastern "B" Debenture stock, to which I have already referred, is merely a pre-preference stock dignified by the title of Debenture stock. The Company is authorized to issue three millions of this Stock by Act of last Session 30 and 31 Vic., cap. ccviii., subject to the priority of "all Mortgage and Debenture Stock granted or issued, " or which may hereafter be granted or issued, under the powers " of any Act relating to the Company, ... and all stock, " including the East Anglian stocks which may be entitled to a " specific charge or lien in any part of the undertaking."

There can be no doubt that loans on such security as Life Interests, which promote assurances, thus bringing two descriptions of profit, are the most desirable for a Life Office; and these loans are of a nature not competed for by the general public. Unfortunately the supply of such securities is very limited, and when others have to be considered I think Railway Debenture Stock should rank among the foremost. I do not propose to enter upon the wide question of the relative merits of other than railway investments for the peculiar requirements of a Life Assurance Company, especially as the two gentlemen to whom I have already referred, have so ably investigated this subject. I have proposed rather to confine myself to the elucidation of a single form of investment, by no means the least interesting and important; and in this respect have followed the example set by Mr. Sprague in the valuable paper read by him at the last meeting.

I may however be permitted so far to depart from my purpose as to draw attention to a subject with which my own avocations render me familiar—I mean the system of short loans adopted by banks and discount Companies, and I do so the more because it is a system which does not, perhaps, receive from actuaries so much attention as it deserves.

These loans are from day to day, or week to week, on such securities as Consols, India bonds, Colonial and Foreign bonds; and by this means capital waiting permanent investment, or which would otherwise remain unproductive, may be utilized, and usually a fair rate of interest obtained.

It is not necessary to insist in this room on the importance to an Assurance Company of having no idle money. We all know that compound interest is to its capital what steam is to an engine. The power of the former is almost beyond computation, and an extra quarter or half per cent may be easily obtained in able hands. In fact the financial arrangements of a Company appear to me of such paramount importance, that rising actuaries cannot, I venture to say, survey too carefully the whole field of sound securities; and this field is constantly extending its boundaries.

NOTE.—It is due to the members to state that, the writer having published in 1866 "A few remarks on Railway Debentures," it has been found impossible to avoid a certain amount of repetition in the foregoing remarks.

The following account of the discussion which followed the reading of the paper, is abridged from the *Insurance Record.*

The PRESIDENT complimented Mr. Coles on his paper. The question of investment was also before them at their last meeting, but its treatment then depended upon those mathematical calculations in which an Actuary was engaged. The present subject called into exercise other qualities equally necessary to an Actuary's reputation, viz., prudence and sagacity. He admitted the great value of the property upon which the proposed investments were secured, and the importance of having every field of employment fairly considered. He hoped to elicit opinions upon these points, where they were likely to differ from Mr. Coles. For instance, in what respect did Debenture Stock differ from the Government Funds? It was now generally recognized that it was desirable for a Life Office to tie up as little as possible in Government Securities; for although the interest was safe, yet the return of the capital in full was very uncertain. Debenture Stock has this disadvantage, in addition to some others peculiar to itself. It would doubtless follow the workings of the money market, and be affected by the same causes which disturb the public funds. Again, a new system of intercommunication might sensibly influence railway property. Looking to the security of the capital, he preferred the system of Bonds for short terms, as the sums lent could be recovered, and if desirable re-invested elsewhere.

Mr. SPRAGUE thought that Mr. Coles's paper came at a suitable time; for although it was several years since Railway Companies began to issue Debenture Stock, it was only since the late panic they had set to work in earnest to convert their Debenture Bonds into Debenture Stock. He was disappointed that the question of the relative merits, to an Assurance Company, of Bonds and Stock had not been gone into more fully. The objection to the Stock was that the recovery of the full capital was uncertain; but Mr. Coles considered it had the advantage over Consols, not only of a higher rate of interest, but a less liability to fluctuation. Railway Companies would have got out their Debenture Stocks much faster had they issued them at the average rate of $4\frac{1}{2}$ per cent, instead of 4 per cent only. He thought that the conversion of Bonds into Stock was due to the Companies' rough experience in the panic, and not to the pressure of public opinion. No doubt Debenture Bonds were unsuitable to Railway Companies, but the very same reasons made them peculiarly eligible for Assurance Offices. It had been a great advantage to them to be able to place out their money at a remunerative rate, with the certainty of recovering it in full in a few years, or of realizing in the mean time at only a trifling loss. He was much interested by Mr. Coles's account of the system of short-term loans, a class of business not yet generally taken up by Assurance Companies, but which seemed well worthy of consideration. It was at present the practice of some Offices to place large sums of money on deposit with the Joint Stock Banks until suitable permanent investments offered; and if better interest with equal security could be got on these short loans, they ought certainly to be adopted. On the other hand, simplicity of finance had great advantages not to be overlooked.

Mr. NEWBATT thought it might be taken as a great fact that a large amount of the funds of Assurance Companies is at the present time invested on the security of Railway Companies in one form or another. Bonds no doubt preponderate, and when there is a choice, with good reason. The conversion of Bonds into Stock was now being proceeded with, and it was for the interest of Assurance Companies that they should well understand what is the alternative which will shortly be presented to them. One Railway Company of considerable magnitude has already closed its Debenture Bond account; and since many are doubtless interested in Bonds which have emanated from that Company, they must be prepared to decide what they will do with the capital thrown on their hands, since they cannot renew in the shape of Bonds. With reference to the admitted advantages which Bonds possess over Stocks, there were two somewhat modifying considerations. In the first place, Stocks need not be bought at par; it is quite open to buy them at a discount, like other Funds. Secondly, Assurance Companies have no imperative need of realizing at a particular juncture, for they know within narrow limits what money they will be called on to provide at a given period, and if the market be unfavourable for the security in question they need only bide their time. Nevertheless, there was an element of security in the Bonds lacking in the Stock. Formerly all the great Railway Companies endeavoured to issue their Stock at the insufficient rate of 4 per cent, consequently it has hitherto been at a discount, and may always yet be so; that is, in effect, the want of strict perfection in the security was compensated for by an increased rate of interest. This higher rate of interest did not necessarily imply that the security was unsound, but that it was of a kind not suited to the requirements of many, or not generally understood. In support of this, he would instance the rates obtained in old times upon loans by way of Annuity—6, 7, or even 8 per cent, instead of 4½ with which they are often content now. No doubt similar reasons have hitherto operated in depressing Railway Securities. The recent judgment of Lord Cairns that the holders of Debentures are only entitled to the first fruits of the tree, and not to the tree itself: that they do not rank as judgment creditors, but have to go in and take their share of what the tolls provide; so that in effect, the capital of Debenture Bonds ranks with the interest on other Debenture Bonds not yet matured, and also on that of the Debenture Stock, has had the effect, speaking broadly, of bringing both Bonds and Stocks into the same category as regards their security, the chief distinction being the chance, in the latter case, of not getting back the capital in its entirety. The same imperfection however existed with regard to other securities, whether ordinary mortgages or not, while here there were counterbalancing profits. Therefore, investments in Debenture Stock, if made with skill and caution and at proper rates of interest, were scarcely, if at all, inferior to Debenture Bonds. He did not share the views of the President as to the possibility of the present system of communication by Railway being superseded. That question might be safely left to our successors.

Mr. Hodge expressed his sense of the value of Mr. Coles's paper, and thought that the statements enabled all to form an opinion as to the advantages and disadvantages of investing in Railway Securities. One point, however, had been left out of consideration, viz., that in lending on Railway Debentures or Stock we are dealing with a mortgage which is not like an ordinary mortgage. In the latter case, we had the security of the whole revenue from the property, but in the former, a large portion of the income pledged was primarily chargeable with expenses—to the extent, on the average, of 50 per cent. A falling off in revenue in this case becomes very important, for unless there be a proportionate reduction of expenses, there is a corresponding failure in the security. Railways were not of the nature of properties, but commercial undertakings. We had a charge only on the produce. There were great advantages attaching to Debenture Bonds, because the money being repayable at a fixed period could be withdrawn if the undertaking were not going on satisfactorily. But, with Debenture Stock, the power of redemption lay with the mortgagor, and the position of the lender was different. The system of Bonds was, in his opinion, superior, even for the Railway Companies themselves; that of Stocks had been a failure, for the amount converted at present was only one-sixth of the whole debt. The public preferred Bonds, which Bonds could always be issued at a lower rate, and on an average of years would cost less than the same amount converted into Stock—say ½ per cent. As an example, the London and North-Western Railway had been unable to get their Debenture Stock out at 4 per cent, and had to offer 5 per cent, at the very time they were borrowing on Bonds at 3½ and 3¾ per cent. A larger rate of interest was necessary when no period was fixed for repayment of the principal, as was the case with the public loans raised by this country in the time of the French wars. A saving of £4,000,000 a year would have been made, had we adopted a different system of borrowing than by selling perpetual annuities. So he thought the Railways were laying on themselves a heavy charge in perpetuity by the issue of Debenture Stock at a higher rate of interest. No one will buy Debenture Stocks at a premium, because they can be created to almost any extent—there being 87 millions ready to be thrown upon the market. He did not think that Debenture Stocks were advisable securities for an Assurance Company, and should strongly protest against them. Bonds, however, might be made a useful and serviceable mode of investment. He did not think that the short loan system could be made available for the purposes of Assurance Companies, for the rates of interest would be low. For the six years ending in 1866 or '67 he had found the average rate of interest allowed by the joint stock banks on deposits was 3½ per cent. Perhaps 1 per cent more might have been got on short loans; but that was not the business of Insurance Companies, but rather of Bankers, and required a great amount of discrimination and care.

Mr. Bailey felt sure that the members would all be glad to read Mr. Coles's paper, and that their gratification would be none the less when they remembered that its author was educated as an actuary, and had passed the Institute Examinations. This paper showed how excellent a training he had had in financial affairs. In a paper of his own, he (Mr. Bailey) had laid down, as the first canon of life assurance finance, that the principal must be secure. As the Offices enter into contracts to pay fixed sums at particular epochs, the fluctuations which must occur, should be in the rate of interest and not in the principal. Consequently Stocks of all descriptions, including those of the British or Foreign Governments and Railway Debenture Stocks, should be avoided. He would illustrate by reference to the accounts of a large Assurance Office, which held on 31st December, 1859, £1,315,000 Consols and £2,845,000 Reduced and New Three per Cents, which they valued at the price of the day—96 for Consols and 94⅝ for the other Stocks. In the eight years ending with 1867, they had occasion to sell £1,220,000 Consols at £92. 8*s*. 5*d*. on the average, and £1,260,000 other Stocks at £88. 17*s*. 10*d*. on the average; the actual loss on these sales being no less than £115,877, which would be a deduction from the profits of the current decennial period. As far as he had observed, there was less fluctuation in the price of Government Securities than in any other. He did know why Mr. Coles should affirm the contrary with regard to Railway Debenture Stocks. However, he could not agree with Mr. Hodge in the unsuitability of Debenture Stocks for other purposes — different securities being suited to different purposes. For private trusts, a steady income was often of more importance than the security of the capital. In the case of marriage settlements, a fixed income was requisite for the life of the husband and wife, while the children were quite content to divide the capital without inquiring very accurately into the original cost of the investment. The present complicated system of Railway finance had arisen from mismanagement. Otherwise, no difficulty would have arisen in renewing Debentures as they fell in. Mortgages on land were easily renewed. He was not sure that the Railway Companies would succeed in their attempt to substitute Debenture Stocks for Debenture Bonds. But if they did succeed, the Assurance Companies would have to look out for other investments.

Mr. EMMENS presumed that Mr. Coles's position was, that Debenture Stocks were characterized by extreme security. It had, however, been pointed out that they were much more insecure than many descriptions of property now adopted as mediums of investment. Railways, being commercial enterprises were subject to many fluctuations; and were liable to be superseded in their turn, as progress was made in mechanical science. It was, therefore, incumbent upon Assurance Offices to see that they have security for 30 or 40 years to come. The course of legislation had been to diminish the value of corporate property. He approved of the system of short loans, if it could be worked with security. His own Company had been able to secure 2 per cent more upon its floating balances, than by the old method of depositing at the Bankers.

Mr. CUTCLIFFE stated that his Society had £630,000 invested in Debenture Bonds of first class Railways at an average rate of interest of 4½ per cent paid to the day. Bonds were better in regard to security than Stocks, but the latter yielded a better return of interest. He thought that Mr. Coles's object was to point out which were the best securities to take, for his Tables showed which Railway Companies had the largest margins. Debenture Bonds of the great Railways were, in his opinion, the best securities for the surplus funds of an Assurance Company.

Mr. HAGGARD thought that there was no fear as to the soundness of the security offered by the Railways. About £5,000,000 would meet the interest upon the present debt, while there was a surplus of £12,000,000 produced by 280,000,000 passengers — and an additional penny per passenger would add £1,000,000 to the receipts. The late financial crisis had seriously affected the railway tolls—to the extent of about 13,000,000 passengers. The pendulum of the railways beats to the pulse of the world at large, and whatever disturbed the commercial kingdom was felt by the railways also. The financial difficulties of the railways arose from their inability to pay off the matured bonds—for manifestly with only a surplus of £14,000,000 they could not meet the £25,000,000 demanded. At the market price of 105, a 5 per cent bond running for 5 years would only pay 4 per cent, while Debenture Stock on the same terms would pay 4¾ per cent in perpetuity. The Debenture Stock of good Railways was already at par, and that of the Great Northern at a premium. Since the revenue of the Railways was doubling and trebling, he thought that these Debenture Stocks would be largely taken up, and that in the course of the next two or three years the Bonds would be converted to a greater extent than was imagined.

Mr. LEMON thought that Mr. Cutcliffe had rightly interpreted the object of the paper, which was to point out which were the best Railways for investment, since the existing Bonds would in the course of events be converted into Stock. The value of the paper lay in the percentage Table, which showed the margin each Company offered for security. A security commanding $4\frac{1}{2}$ or 5 per cent would always fetch its fair value and would not fluctuate much.

Mr. GALSWORTHY thought that Mr. Lemon had overlooked the fact, that an Assurance Company must look to its power of realizing capital, as well as mere security and interest. Mr. Bailey had instanced a loss of £115,000 upon the realization of a fluctuating security—the same would apply to many of the Debenture Stocks. This fact alone would suggest caution. The high rate of interest referred to by Mr. Cutcliffe, as having been made by investments in these Stocks, was doubtless due to their being purchased at a price for which they could not now be obtained. If this rise in value be permanent, they would not pay so well as they had done. He did not think that Debenture Stocks were desirable investments for an Assurance Company. If it were once admitted that they were, there would be no knowing where to draw the line; and there would always be the risk of getting hold of some of the bad securities as well as of the good.

The PRESIDENT was of opinion that the question was, as to the advisability of Assurance Companies investing in Debenture Stock in preference to Debentures. Mr. Coles's Tables were of the utmost value in enabling us to form a conclusion as to which were the right stocks to invest in, if they be purchased at all. There were, however, many drawbacks to such investments. Amongst the principal of which, was the uncertainty of Railways maintaining their position in the future, if any great discovery should be made to cheapen the cost of communication. The next aspect of the case—that of security—deserved serious consideration. In a paper laid before the British Association in 1838 (and the relative positions of preference and debenture debt was much the same now), he had shown that the total capital of the Railways was £315,000,000—of which £78,000,000 consisted of loans, and £58,000,000 of preference stock. These latter bore interest at about £4. 17*s*. 4*d*. per cent, and the ordinary stock £3. 12*s*. per cent, and the loans above £$4\frac{1}{2}$ per cent. He did not, therefore, think that the Railway Companies would be able to exchange very rapidly their Bonds for Stock at anything like 4 per cent interest. No doubt, by taking advantage of favourable markets, they might in a number of years partially achieve their object. He preferred the system of short loans for the purposes of Assurance Companies. The recent legislation supplied some additional security by giving a considerable check upon railway accounts and preventing an over issue of Debentures. Improvement was going on in the character of Railway Stocks which would enable the public who want regular interest to purchase them. But after all, Assurance Companies must look to those classes of securities which for the main portion of their investments will preserve their capital, as well as afford them a fair rate of interest.

Mr. COLES, in reply, after acknowledging the reception with which his paper had met, explained that he had assumed that the Assurance Companies held very largely in Debenture Bonds, and that they would not have the option of renewing them. The Railways, finding that 4 per cent interest did not facilitate the issue of the Debenture Stocks, had increased the rate. A slight increase turned the scale, and the whole of the Bonds would, he thought, be converted into Stock, and the Assurance Companies would have the alternative of taking this or nothing. His object was, therefore, to point out that certain Railways are stronger than others, and to supply the means of ascertaining the relative strength of the Companies. Thus, in the case of the North-Eastern, if the alternative of 4 per cent Bonds or $4\frac{1}{2}$ per cent Stock be presented, the latter would be preferable, since it would not depreciate $\frac{1}{2}$ per cent per annum. This Stock, though issued at par, was now at 104. A $4\frac{1}{2}$ per cent Stock gave an advantage of $1\frac{1}{4}$ per cent over Consols, and was certainly the better finance. He thought that the Stock was equal in security to the Bonds, and that the latter were only an incubus to the Company and depressed the Stock. If the Bonds were cleared off, we should have a species of Railway Consols. The argument as to Railways vanishing, was equally applicable to gas and other undertakings.

In answer to some observations he proceeded to say — The London and North-Western Railway owe under Bonds £12,000,000, and are liable to be called upon to repay those Bonds; if they run on an average for 3 years, they are liable for £4,000,000 a year, and the whole of the surplus, after paying debenture interest, is only £2,000,000. If such a year as 1866 should occur again, they cannot meet these Bonds except by borrowing at an extravagantly high rate. They can now get stock out at $4\frac{1}{4}$, and easily at $4\frac{1}{2}$ per cent, and the stock runs at once to a premium. The conversion of Debenture Bonds into Stock was proceeding rapidly, and would, he thought, in a few years be complete.

Extracts from the Opening Address of the President of Section F (Economic Science and Statistics), of the British Association for the Advancement of Science, at the Thirty-Eighth Meeting, at Norwich, August, 1868. *By* SAMUEL BROWN, ESQ., F.S.S., *President of the Institute of Actuaries.*

Insurance.

LEAVING subjects still so full of doubts and difficulties (technical education, capital and wages, strikes and trades-unions), we turn to one which, though established upon laws of nature equally recondite, has been pushed into practice with an energy and success highly creditable to this country. Vital statistics are now assuming a form which enable the most complicated problems of human life to be dealt with as if they were certain and simple events. Yet little more than a century has elapsed since the Attorney and Solicitor-General of that day, when reporting on the application for a royal charter to the first society formed on scientific principles for the assurance of life, objected to it on the ground that its success must depend on calculations taken on tables of life and death, whereby the chance of mortality is attempted to be reduced to a certain standard. "This is a mere