

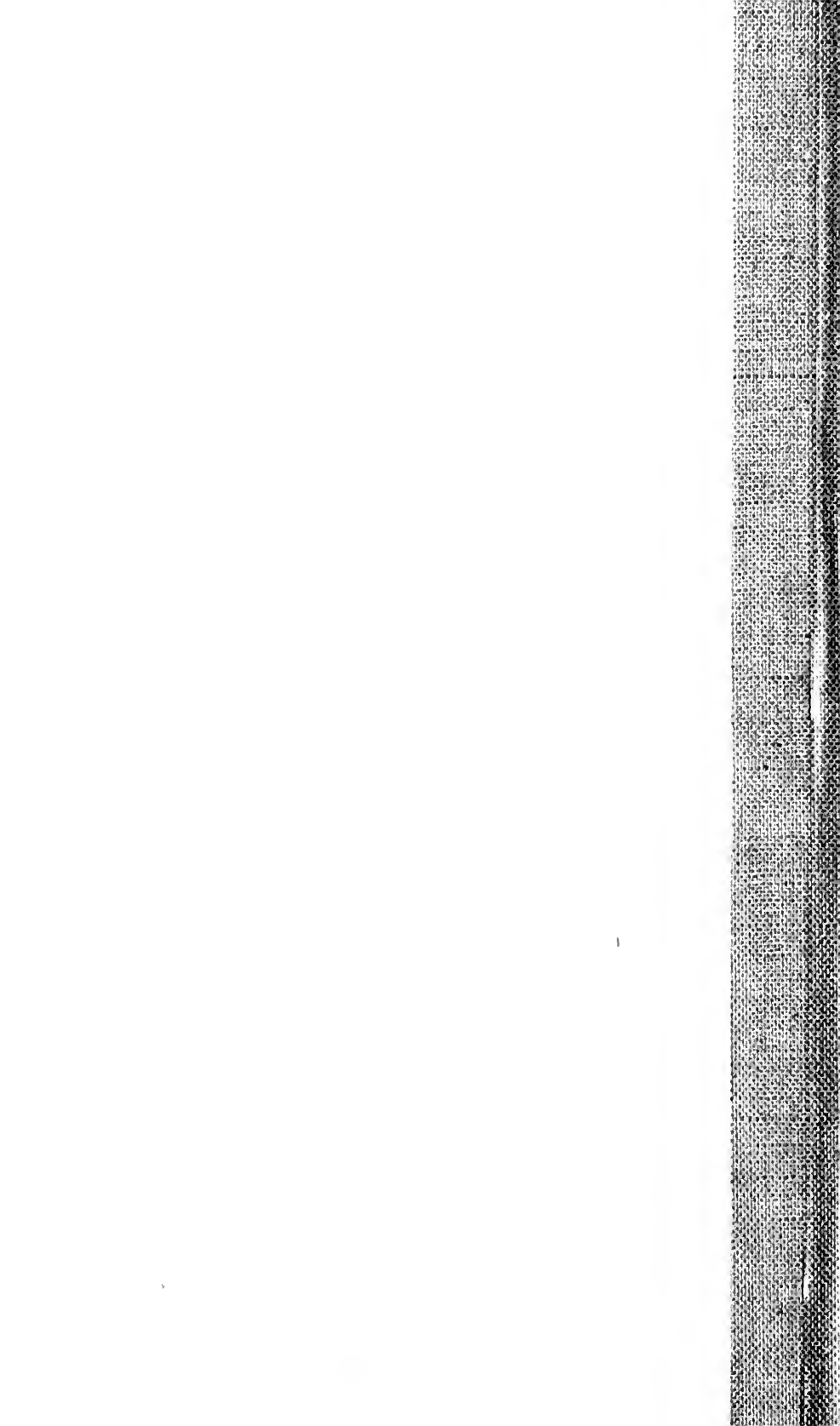
Baxter, Robert D.

Results of rail-
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REPORT
OF THE
UNIVERSITY OF KILMASNOCK

RESULTS

OF

RAILWAY EXTENSION.

*A PAPER READ BEFORE THE STATISTICAL SOCIETY
OF LONDON, BY R. DUDLEY BAXTER, M. A.,
IN NOVEMBER, 1866.*

Four Hundred and Forty Mil-
lions of Government Subsidy
to the Cotton Railroads
in India.



RAILWAY EXTENSION AND ITS RESULTS.

I.—INTRODUCTION.

If a Roman Emperor, in the most prosperous age of the empire, had commanded a history to be written of that wonderful system of roads which consolidated the Roman power, and carried her laws and customs to the boundaries of the accessible world, it would have afforded a just subject for national pride. The invention and perfecting of the art of road making, its sagacious adoption by the State, its engineering triumphs, its splendid roads through Italy, through Gaul, through Spain, through Britain, through Germany, through Macedonia, through Asia Minor, through the chief islands of the Mediterranean, and through Northern Africa; all these would have been recounted as proofs of Roman energy and magnificence, and as introducing a new instrument of civilization, and creating a new epoch in the history of mankind.

A similar triumph may fairly be claimed by Great Britain. The Romans were the great road-makers of the ancient world—the English are the great railroad makers of the modern world. The tramway was an English invention, the locomotive was the production of English genius, and the first railways were constructed and carried to success in England. We have covered with railroads the fairest districts of the United Kingdom, and developed railways in our colonies of Canada and India. But we have done much more than this, we have introduced them into almost every civilized country. Belgian railways were planned by George Stephenson. The great French system received an important impulse from Locke. In Holland, in Italy, in Spain, in Portugal, in Norway, in Denmark, in Russia, in Egypt, in Turkey, in Asia Minor, in Algeria, in the West Indies, and in South America, Englishmen have led the way in railway enterprise and construction. To this day, wherever an undertaking of more than ordinary difficulty presents itself, the aid is invoked of English engineers, English contractors, English navvies, and English shareholders; and a large portion of the rails with which the line is laid, and the engines and rolling stock with which it is worked, are brought from England.

To Englishmen the annals of railways must always be of the highest interest, and I trust that the brief inquiry upon which I am about to enter will not be deemed a waste of labor. I propose to examine into the extension of railways at home and abroad, to show the rate at which it is proceeding, the expenditure which it has cost, and its vast commercial

results. The practical questions will follow whether the construction of railways in the United Kingdom has reached its proper limit? Are we over-railroaded, as some assert, so that railways ought to be discouraged? Or are we under-railroaded, so that fresh railways ought to be invited? Are other nations passing us in the race of railway development? And, lastly, can any improvement be introduced into our railway legislation?

II.—RAILWAYS IN THE UNITED KINGDOM.

So far as roads are concerned, the dark ages may be said to have lasted from the evacuation of Britain by the Romans in 448 to the beginning of the last century. During the whole of that period nothing could be more barbarous or impassable than English highways. The Scotch rebellions first drew attention to the necessity of good roads. The first step was to establish turnpikes, with their attendant wagons and stage coaches, superseding the long strings of pack-horses which, up to that time, had been the principal means of transport. The second step was to render navigable the rivers which passed through the chief seats of industry. The third, which commenced later in the century, was to imitate the rivers by canals, and to construct through the north and centre of England a net-work of 2,600 miles of water communication at an outlay of £50,000,000 sterling. But roads and canals combined were insufficient for the trade of Lancashire and Yorkshire, and bitter complaints were made of expense and delay in the transmission of their goods.

The desired improvement came from the mining districts. Since the year 1700 it had been the custom to use wooden rails for the passage of the trucks: About the year 1800 Mr. Outram, in Derbyshire, laid down iron rails upon stone sleepers, and the roads so constructed took from him the name of Outram's Ways or Tramways. About the year 1814 the ingenuity of mining engineers developed the stationary steam engine into a rude locomotive, capable of drawing heavy loads at the rate of four or five miles an hour. It was proposed to construct a public railway on this principle between Stockton and Darlington. After much delay the line was opened by George Stephenson in 1825, and the experiment was successful as a goods line—unsuccessful, from its slowness, as a passenger line. The next experiment was the Manchester and Liverpool railway, projected as a goods line to accommodate the increasing trade of those two places, which was crippled by the high rates of the canal and navigation. Before the railway was completed, another great improvement had taken place in the construction of locomotives by the discovery of the multitubular boiler, which immensely increased the volume of steam and the speed attainable.

The opening of the Manchester and Liverpool railway on 15th September, 1830, was the formal commencement of the railway era. On that day the public saw for the first time immense trains of carriages, loaded with passengers, conveyed at a rate of more than fifteen miles an hour, a speed which was largely exceeded in subsequent trials. The desideratum was at length obtained, viz: the conveyance of large masses of passengers and goods with ease and rapidity; and it was seen that the discovery must revolutionize the whole system of inland communication.

The public feeling was strangely excited. Commercial men and men of enterprise were enthusiastic in favor of the new railways, and eager

for their introduction all over the country. But the vested interests of roads and canals, and landed proprietors who feared that their estates would be injured, together with the great body of the public, were violently prejudiced against them. Railways had to fight their way against the most strenuous opposition. I quote from the "Life of Robert Stephenson," the engineer of the London and Birmingham line :

"In every parish through which Robert Stephenson passed he was eyed with suspicion by the inhabitants, and not seldom menaced by violence. The aristocracy regarded the irruption as an interference with territorial rights. The humbler classes were not less exasperated, as they feared the railway movement would injure those industrial interests by which they lived. In London, journalists and pamphleteers distributed criticisms, which were manifestly absurd, and prophecies which time has signally falsified." —Vol. i., p. 169.

The city of Northampton was so vehement in its opposition that the line was diverted to a distance of five miles, through the Kilsby Tunnel, to the permanent injury both of the city and railway. The bill was thrown out in Parliament, and only passed in the following session by the most lavish expenditure in buying off opposition.

Other lines were soon obtained in spite of the same vehement hostility. The Grand Junction railway from Liverpool to Birmingham was passed in 1833. The Eastern Counties railway was sanctioned in 1834. It was launched as a 15 per cent. line. It is said that a wealthy banker in the eastern counties made a will, leaving considerable property to trustees to be expended in parliamentary opposition to railways. The Great Western was thrown out in 1834, but passed in 1835. The London and Southampton, now the London and Southwestern, was proposed in 1832, but was not sanctioned till 1834.

In 1836 came the first railway mania. Up to this time the difficulty had been to pass any bill at all; now competing schemes began to be brought before Parliament. Brighton was fought for by no less than five companies, at the total expenditure of £200,000. The Southeastern obtained its act after a severe contest with the Mid Kent and Central Kent. Twenty-nine bills were passed by Parliament authorizing the construction of 994 miles of railway. In the autumn the mania raged with the greatest violence. "There is scarcely," said the Edinburgh Review, "a practicable line between two considerable places, however remote, that has not been occupied by a company; frequently two, three, or four rival lines have started simultaneously." The winter brought a crash, and the shares of the best companies became almost unsaleable.

In 1845 most of the great lines had proved a success. The London and Birmingham was paying 10 per cent., the Grand Junction 11 per cent., the Stockton and Darlington 15 per cent., and railway shares were on an average at 100 per cent. premium. The railway mania broke out with redoubled violence; railways appeared an El Dorado. The number of miles then open was 2,148. The number of miles sanctioned by Parliament in the three following sessions was:

1845.....	2,700
1846.....	4,538
1847.....	1,354
Total.....	8,592

Had all these lines been constructed, we should have had in 1852 more than 10,700 miles of railway, a number which was not actually reached till 1861, or nine years later. But the collapse in 1846 was so severe that an act was passed for the purpose of facilitating the dissolution of companies, and a large number of lines were abandoned, amounting, it is said, to 2,800 miles.

Railway extension was now menaced with a new danger. The effect of the panic was so great, and the losses on shares so severe, that the confidence of the public was destroyed. Besides this, as the new lines were opened, the dividends gradually decreased till the percentage of profit on capital had gone down from 5½ per cent. in 1845 to 3½ in 1849 and 3½ in 1850, leaving scarcely anything for ordinary shareholders. As a consequence, shareholders' lines were at an end. But since 1846 a new custom had been gaining ground of the amalgamation of smaller into larger companies. I may instance the North Eastern Company, which consists of twenty-five originally independent railways. In this manner eleven powerful companies had been formed, which divided the greater part of England between them. The competition between these companies for the possession of the country was very great, and by amalgamations, leases, guarantees, and preference stocks, they financed a large number of lines which otherwise could not be made. In this manner the construction of railways between 1850 and 1858 progressed at the rate of nearly 400 miles a year.

But towards the end of 1858 the great companies had exhausted their funds and ardor, and proposed terms of peace. The technical phrase was "that the companies required rest." Again it seemed probable that railway extension would be checked. But a new state of things arose. Twenty years of railway construction had brought forward many great contractors, who made a business of financing and carrying through lines which they thought profitable. The system had grown up gradually under the wing of the companies, and it now came to the front, aided by a great improvement in the value of railway property, on which the percentage of profits to capital expended had gradually risen from 3½ per cent. in 1850 to 4½ in 1860. The companies also found it their interest to make quiet extensions when required by the traffic of the country. Thus railway construction was continued in the accelerated ratio of more than 500 miles a year. The following table gives a summary of the rate of progress from 1845 to 1865:—

UNITED KINGDOM—MILES CONSTRUCTED.

Year.	Miles Opened.	Average Number. Opened per An.
1834	about 200	133
1840	1,200	
1845	2,440	240
1850	6,500	812
1855	8,335	367
1860	10,434	425
1865	13,289	571

During the same year the percentage of profits to capital expended were as follows:—

	Per cent.		Per cent.
1845	5.48	1860	4.39
1850	3.31	1865	4.46
1855	3.90		

The latter table, which is abridged from an annual statement in *Herepath's Journal*, scarcely gives an idea of the gradual manner in which the dividends sunk from their highest point in 1845 to their lowest in 1850, and of their equally gradual recovery from 1850 to 1860 and 1865. The main results of the two tables are, first, the close connection between the profit of one period and the average number of miles constructed in the next five years; and, second, the fact that the construction of railways in the United Kingdom has been steadily increasing since 1855, and is now more than 500 miles per annum.

The number of miles authorized by Parliament during the last six years is stated in the *Railway Times* to be as follows:—

Year.	Miles.	Year.	Miles.
1861	1,332	1864	1,329
1862	809	1865	1,996
1863	795	1866	1,062
			<hr/>
			7,323
Average.....			1,220

Hence the miles authorized by Parliament for the last six years have been double the number constructed; and there must be about 3,500 miles not begun or not completed—a number sufficient to occupy us for fully seven years, at our present rate of construction.

Such is a brief summary of the history of railway extension in Great Britain and Ireland. It may be thrown into five periods:

1. The period of experiment, from 1820 to 1830.
2. The period of infancy, from 1830 to 1845.
3. The period of mania, from 1845 to 1848.
4. The period of competition by great companies, from 1848 to 1859.
5. The period of contractors' lines and companies' extensions, from 1859 to 1865.

III.—DISTRIBUTION OF RAILWAYS IN THE UNITED KINGDOM.

The returns of the Board of Trade to the end of 1865 give the following distribution of the 13,289 miles then open:—

	Double Lines.	Single Lines.	Total Miles Open.
England and Wales.....	6,081	3,170	9,251
Scotland.....	946	1,254	2,200
Ireland.....	476	1,362	1,838
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	7,503	5,786	13,289

Hence there is a considerable preponderance of double lines over single lines in England, and of single lines over double in Scotland and Ireland.

The following table shows which country has the greatest length of railways in proportion to its area:—

	Area in Square Miles.	Railway Mileage.	Square Miles. per Mile of Railway
England and Wales.....	57,812	9,251	6.25
Scotland.....	30,715	2,200	14.
Ireland.....	32,512	1,838	17.7

So that England and Wales have a mile of railway for every six and a half square miles of country, being the highest proportion in the world, while Scotland has less than half that accommodation, and Ireland little more than one-third.

The following table shows which country has the greatest length of railway in proportion to population :—

	Population in 1860.	Railway Mileage.	Population per Mile of Railway.
England and Wales.....	20,228,497	9,251	2,186
Scotland.....	3,096,308	2,200	1,409
Ireland.....	5,850,309	1,838	3,182

So that Scotland, a thinly inhabited country, has the greatest railway mileage in proportion to her population, and we shall afterwards find that she stands at the head of all European countries in this respect.

The manner in which this railway mileage is distributed through England deserves some attention. A railway map will show that the general direction of English lines is towards the metropolis. London is a centre to which nearly all the main lines converge. Every large town is, in its degree, a centre of railway convergence. For example, look at the lines radiating from Leeds, from Hull, from Birmingham, or from Bristol. But all those lesser stars revolve, so to speak, round the metropolis as a central sun.

A great deal may be learned of the character and political state of a country from the convergence of its railway lines. Centralizing France concentrates them all on Paris. Spain, another nation of the Latin race, directs her railways on Madrid. Italy shows her past deficiency of unity, and want of a capital, by her straggling and centerless railroads. Belgium is evidently a collection of co-equal cities without any preponderating focus. Germany betrays her territorial divisions by the multitude of her railway centres. Austria, on the contrary, shows her unity by the convergence of her lines on Vienna. The United States of America prove their federal independence by the number of their centres of radiation.

The national character of the English nation may be traced in the same way. Though our railways point towards London, they have also another point of convergence—towards Manchester and the great port of Liverpool. The London and Northwestern, the Great Northern (by the Manchester, Sheffield and Lincolnshire line), the Great Western and the Midland run to Manchester and Liverpool from the south. The Manchester, Sheffield and Lincolnshire railway, the London and Northwestern Yorkshire and Carlisle lines, and the network of the Lancashire and Yorkshire Company converge on them from the east and north. The London and Northwestern Welsh railways and the Mid Wales and South Wales lines communicate with them from the west. Thus our railway system shows that Manchester and Liverpool are the manufacturing and commercial capitals of the country, as London is its monetary and

political metropolis, and that the French centralization into a single great city does not exist in England.

It remains to describe the great systems into which the English railways have been amalgamated. There are in England twelve great companies, with more than £14,000,000 each of capital, which in the aggregate comprises nearly seven-eighths of our total mileage and capital. They divide the country into twelve railway kingdoms, generally well defined, but sometimes intermingled in the most intricate manner. They may be classified into the following seven districts:—

	Miles Open.	Capital Expended.
1. <i>Northwestern District</i> —London and Northwestern Railway.....	1,306	£53,210,000
2. <i>Midland District</i> —Midland Railway.....	677	26,103,000
3. <i>Northeastern District</i> —Great Northern Railway.....	422	18,200,000
Northeastern Railway.....	1,121	41,158,000
4. <i>Mersey to Humber District</i> —Lancashire and Yorkshire Railway.....	403	21,114,000
Manchester, Sheffield and Lincolnshire Railway.....	246	14,113,000
5. <i>Eastern District</i> —Great Eastern Railway.....	709	23,574,000
6. <i>Southeastern District</i> —Southeastern Railway.....	319	18,626,000
London, Chatham and Dover Railway.....	175	14,768,000
London and Brighton Railway.....	294	14,561,000
7. <i>Southwestern District</i> —London and Southwestern Railway.....	500	16,364,000
Great Western Railway.....	1,292	47,630,000
Total.....	7,564	£309,421,000

In Scotland there are three great companies:—

	Miles Open.	Capital Expended.
1. <i>Southeast Coast</i> —North British Railway.....	732	£17,802,000
2. <i>Central District</i> —Caledonian Railway.....	561	14,797,000
3. <i>Southwest Coast</i> —Glasgow and Southwestern.....	249	5,603,000
Total.....	1,542	£38,202,000

which include three-fourths of the whole mileage and capital of Scotch railways.

In Ireland there are only two large companies:—

	Miles Open.	Capital Expended.
1. <i>Southwestern District</i> —Great Southern and Western.....	420	£5,712,000
2. <i>Midland District</i> —Midland Great Western.....	260	3,625,000
Total.....	680	£9,337,000

which embrace rather more than two-fifths of the capital and mileage.

The above figures are taken from *Herepath's Railway Journal*, made up very nearly to the present time.

The following table shows the average gross receipts and net profits, for three years, for the United Kingdom, and also the dividends paid on ordinary stock in the above great companies, except the London, Chatham and Dover:—

AVERAGE RECEIPTS AND DIVIDENDS PER CENT.

	1857.	1861.	1865.
Gross receipts.....	7.87	8.27	8.57
Net profits.....	4.19	4.30	4.46

<i>Dividends of Great Companies :</i>	1857.	1861.	1865.
12 English	4.00	4.45	4.65
3 Scotch.....	4.55	4.90	5.70
2 Irish.....	5.00	5.00	3.56
Average dividends.....	4.51	4.78	4.64

IV.—COST OF RAILWAYS IN THE UNITED KINGDOM.

The total capital authorized and expended, up to the end of 1865, is given in the Board of Trade Returns, as follows, including the companies estimated for, which have not made a return:—

CAPITAL AUTHORIZED.	
Shares	£434,457,000
Loans.....	143,968,000
Total.....	£578,425,000

CAPITAL EXPENDED.	
<i>Debenture Capital :</i>	
Stock	£13,312,000
Mortgages.....	98,059,000—111,871,000
Preference capital.....	124,517,000
Ordinary capital.....	220,033,000
	£456,421,000

Hence the following conclusions:—

1. *The capital expended is more than half as large as the national debt.*
2. The debenture and preference capital, which are practically first and second mortgages of railway property, amounted in 1865 to more than half the whole capital expended.

So that railway property is virtually mortgaged to the debenture and preference capitalist for about half its value.

The preference capital has for some years been steadily increasing, while the ordinary capital has remained almost stationary. During 1865 the preference capital increased by £19,615,000, while the ordinary capital only increased by £4,650,000. As the old companies almost always increase their capital by preference stock, I anticipate that in seven or eight years the debenture and preference capital will have risen to two-thirds of the capital expended.

3. The unissued or unpaid capital was, in 1864, £95,000,000. This increased largely in 1865, by the great number of miles authorized in that year, and in the return for that year is £122,000,000.

The expenditure was, in 1864, divided between the three kingdoms in the following proportions, including non-returning companies:—

	Capital Expended.	Cost per Mile of Railway.
England and Wales	£379,000,000	£41,033
Scotland.....	50,206,000	22,820
Ireland	26,394,000	14,360

Thus Ireland has made her railways for one-third the cost, and Scotland for little more than half the cost of the English railways—a result which might be partly expected from their larger proportions of single lines, the greater cheapness of land, and in Ireland the lower wages of labor.

But the English expenditure is the highest in the world, and has given rise to severe remarks on the wastefulness of the English system. Let us examine the causes of expense.

1. The English expenditure includes, on a probable estimate, no less than £40,000,000 sterling absorbed by metropolitan railways and termini. This of itself is £4,500 per mile on the 8,890 miles constructed.

It also includes very large sums for termini in Manchester, Liverpool, Leeds, Sheffield, Birmingham and other great towns, far beyond what is paid in continental cities.

2. The English expenditure also includes considerable capital for docks, as at Grimsby, where £1,000,000 was laid out by the Manchester, Sheffield and Lincolnshire Company; and at Hartlepool, where £1,250,000 was spent by a company now merged in the Northeastern.

It also includes in many instances capital expended on steamers and capital for the purchase of canals.

3. The counties whose trade and population is greatest, and which are most thickly studded with railways, as Lancashire, Yorkshire, and Glamorgan, are exceedingly hilly, and necessitate heavy embankments, cuttings and tunnels, which enormously increase the cost of construction. The Lancashire and Yorkshire Railway has cost £52,400 per mile for the whole of its 403 miles. Had those counties been as flat as Belgium the company might probably have saved something like £20,000 per mile, or £8,000,000 sterling. The Manchester, Sheffield and Lincolnshire Company, even after deducting £1,000,000 for the docks of Grimsby, have spent £53,000 per mile. A flat country might have saved them a similar sum per mile, or £5,000,000 sterling.

4. England, as the inventor of railways, had to buy experience in their construction. Other nations have profited by it. There is no doubt that our present system of lines could now be made at very much less than their original cost. In addition we have paid for experiments, such as the broad gauge and atmospheric railway.

5. The great preponderance of double lines over single (6,081 miles against 3,170) has largely increased the expense as compared with the single lines, which predominate in other countries.

6. The price of land in a thickly populated country like England must necessarily be higher than in the more thinly inhabited continental countries. But beyond this, English landowners, in the first vehement opposition to railways, acquired the habit of being bought off at high prices, and of exacting immense sums for imaginary damages. The first Eastern Counties line was said to have paid £12,000 per mile for land through an agricultural country, being about ten times its real value. This habit of exaction has been perpetuated to our own day. As an every day instance I may mention that, only a few months ago a gentleman of great wealth was selling to a railway company, which he had supported in Parliament, thirty acres of grass land, of which the admitted agricultural value was £100 an acre, and three acres of limestone, of which the proved value to a quarryman was £300 an acre. There was no residential damage, and the railway skirted the outside of the estate. The price of the whole in an auction room would have been about £4,000. The proprietor's agent, supported by a troop of eminent valuers, demanded £25,000.

7. Parliamentary expenses are an item of English expenditure not occurring in countries where the concession of railways is the province of a department of the government. But in those countries there is almost always a "promoter's fund" and secret service fund, which often attain very large dimensions. Which is the preferable alternative? Besides, those who object to parliamentary committees must be prepared to give us a practicable substitute, which will suit the habits and feelings of the British nation. Now, a free nation must have liberty to bring forward schemes for the public accommodation, and to have them decided by some public tribunal, after full investigation and hearing all parties. There must be witnesses, and, where millions of money are at stake, there must be the power of being represented by the ablest advocates. Commissions appointed by the Board of Trade, or any other department, would be just as expensive. The expense of parliamentary committees is the price we pay for free trade in railways, and for our present amount of railway development.

I believe that these causes will fully account for the higher cost of English railways, and, except as regards the cost of land, I think that no valid or practical objection can be taken to them. There is certainly the consolation of knowing that in return for our money we have a more efficient system of railways than any other country.

V.—TRAFFIC AND BENEFIT OF RAILWAYS IN THE UNITED KINGDOM.

In order to appreciate the wonderful increase of traffic which has resulted from railways, it is necessary to know the traffic of the kingdom before their introduction.

Previous to the opening of the great trunk lines in 1835, passengers were conveyed by mail and stage coaches, a system which had reached a high degree of perfection. Mr. Porter, in his "Progress of the Nation," has calculated, from the stage coach license returns, the total number of miles traveled by passengers during 1834 as 358,290,000, which represented 30,000,000 persons traveling 12 miles each. The fares were very high, being by the mails 6d. a mile inside and 4d. outside, exclusive of coachmen and guards, and rather less on the stage coaches. Including coachmen and guards, the average fares paid may be taken at 5d. per mile. Hence the 30,000,000 passengers paid a total of £6,250,000.

Goods were conveyed by water or by road.

Water communication had been developed with great perseverance, and was nearly as follows:—

	Miles.
Canals—England.....	2,600
Scotland.....	225
Ireland.....	275—3,100
Navigations.....	900
Total.....	4,000

Being one mile to every thirty square miles of country.

Canal companies always regarded with great jealousy any attempt to ascertain the amount of their traffic, and the only calculation I can find is in Smiles' "Life of Brindley," (p. 464,) where it is estimated at 20,000,000 tons annually. The rates charged by canal carriers were, for the great bulk of general goods, about 4d. per ton per mile. Thus, Lon-

don to Birmingham was 40s. per ton, and London to Manchester 70s. to 80s., the direct distances being 113 and 200 miles. The rates for coal were considerably less, but so high as to restrict its carriage to short distances, and to render its amount inconsiderable.

The tonnage carried by road appears to have been about one-sixth of that conveyed by canal, and may be taken at 3,000,000 tons. The rates by road were about 13d. per ton per mile, the stage wagons from London to Birmingham charging no less than £6 per ton for the 113 miles, and those from London to Leeds the enormous amount of £13 per ton for 190 miles. Assuming that each ton by road or water was carried 20 miles—a less average than at present—the total rates paid would have been nearly £8,000,000. Hence the total traffic receipts about the year 1834 may be calculated as follows:—

Passengers.....	30,000,000 =	£6,250,000
Goods.....	tons 23,000,000 =	8,000,000
		£14,250,000

The effect of railways was very remarkable. It might reasonably be supposed that the new means of communication would have supplanted and destroyed the old. Singular to relate, no diminution has taken place either in the road or canal traffic. As fast as coaches were run off the main roads they were put on the side roads, or re-appeared in the shape of omnibuses. At the present moment there is probably a larger mileage of road passenger traffic than in 1834. The railway traffic is new and additional traffic. But railways reduced the fares very materially. For instance, the journey from Doncaster to London by mail used to cost £5 inside and £3 outside, (exclusive of food,) for 156 miles, performed in twenty hours. The railway fares are now 27s. 6d. first class, and 21s. second class for the same distance, performed in four hours. The average fares now paid by first, second, and third class passengers are 1½d. per mile, against an average of 5d. in the coaching days, being little more than one-fourth of the former amounts.

On canals the effect of railway competition was also to lower the rates to one-fourth of the former charges. In consequence the canal tonnage actually increased, and is now considerably larger than it was before the competition of railways. Hence the railway goods traffic, like its passenger traffic, is entirely a new traffic. The saving in cost is also very great; goods are carried by rail at an average of 1½d. per ton, or 40 per cent. of the old canal rates.

Now observe the growth of this new railway traffic. The following table from the Parliamentary returns (except for 1865) shows the receipts from passenger and goods traffic on railways in the following years:—

INCREASE OF TRAFFIC.

	Total Receipts.	Average Annual Increase.	Average of whole 22 years.
1843.....	£4,535,000	} £1,070,000	} £1,423,000
1848.....	9,933,000		
1855.....	21,507,000		
1860.....	27,766,000		
1865.....	35,890,000		

Thus the average annual increase for the whole twenty-two years was £1,423,000 per annum; and the increase was largest in the latest years.

The traffic in 1864 and 1865 was thus made up:—

	1864.	1865.
Passengers.....	£15,684,000	£16,572,000
Goods.....	18,331,000	19,318,000
Total receipts.....	£34,015,000	£35,890,000

And the things carried were, exclusive of carriages and animals,—

	1864	1865.
Passengers.....	229,272,000	251,863,000
Goods, tons	110,400,000	114,593,000

Being six times as many as before the introduction of railways.

The increase was extraordinary.

	1864 over 1863.	1865 over 1864.
Increase in passenger receipts.....	£1,163,000	£888,000
“ goods “	1,696,000	986,000
	£2,859,000	£1,874,000

So that the increase in 1864 was just double the average annual increase.

The increase in things carried was :

	1864 over 1863.	1865 over 1864.
Increase in number of passengers....	24,637,000	22,590,000
“ tons of goods.....	9,800,000	4,233,000

An increase in 1864 equal to five-sixths of the whole number of passengers in 1834, and to five-twelfths of the total goods tonnage in 1834; a wonderful proof of the capabilities and benefits of the railway system.

Now let us examine the saving to the country. Had the railway traffic of 1865 been conveyed by canal and road at the pre-railway rates, it would have cost three times as much. Instead of £36,000,000 it would have cost £108,000,000. Hence there is a saving of £72,000,000 a year, or more than the whole taxation of the United Kingdom.

But the real benefit is far beyond even this vast saving. If the traffic had been already in existence it would have been cheapened to this extent. But it was not previously in existence; it was a new traffic, created by railways, and impossible without railways. To create such a traffic, or to furnish the machinery by which alone it could exist, is a far higher merit than to cheapen an existing traffic, and has had far greater influence on the prosperity of the nation.

Look at the effects on commerce. Before 1833 the exports and imports were almost stationary. Since that time they have increased as follows:—

INCREASE OF EXPORTS AND IMPORTS.

One Year.	Total Exports and Imports	Per cent. Increase.	Per cent. per annum Increase.
1833.....	£85,500,000	36	4
1842.....	116,000,000		
1850.....	171,000,000	47	6
1855.....	260,000,000		
1860.....	375,000,000	52	10.4
1865.....	490,000,000		
		44	9
		30	6

I am far from attributing the whole of this increase to railways. Free trade, steamboats, the improvements in machinery, and other causes contributed powerfully to accelerate its progress. But I wish to call attention to two facts.

1. This increase could not have taken place without railways. It would have been physically impossible to convey the quantity of goods, still less to do so with the necessary rapidity.

Mr Francis, in his "History of Railways," draws a striking picture of the obstacles to commerce in 1824, from the want of means of conveyance :

"Although the wealth and importance of Manchester and Liverpool had immensely increased, there was no increase in the carriage power between the two places. The canal companies enjoyed a virtual monopoly. Their agents were despotic in their treatment of the great houses which supported them. The charges, though high, were submitted to, but the time lost was unbearable. Although the facilities of transit were manifestly deficient, although the barges got aground, although for ten days during summer the canals were stopped by draught, and in severe winters frozen up for weeks, yet the agents established a rotation by which they sent as much or as little as suited them, and shipped it how or when they pleased. They held levees attended by crowds, who almost implored them to forward their goods. The effects were disastrous: mills stood still for want of material; machines were stopped for lack of food. Another feature was the extreme slowness of communication. The average time of one company between Liverpool and Manchester was four days, and of another thirty-six hours; and the goods, although conveyed across the Atlantic in twenty-one days, were often kept six weeks in the docks and warehouses of Liverpool before they could be conveyed to Manchester. 'I took so much for you yesterday, and I can only take so much to-day,' was the reply when an urgent demand was made. The exchange of Liverpool resounded with merchants' complaints; the counting-houses of Manchester re-echoed the murmurs of manufacturers."—Vol. i., p. 77 and 78.

This intolerable tyranny produced the Manchester and Liverpool railway, and gave the greatest impetus to railway development.

2. *The increase of imports and exports was in strict proportion to the development of railways.* The following table shows the miles of railway and navigation opened, and the total exports and imports. It must be remembered that there are about 4,000 miles of navigation, and that the exports and imports had been for some time stationary before 1833:—

PROPORTION OF EXPORTS AND IMPORTS TO RAILWAYS AND NAVIGATION.

Year.	Miles of railway and navigation.	Total exports and imports.	Exports and imp'ts per mile.
1833.....	4,000	£85,500,000	£21,375
1840.....	5,200	119,000,000	22,884
1845.....	6,441	135,000,000	20,959
1850.....	10,733	171,800,000	16,006
1855.....	12,334	260,234,000	21,098
1860.....	14,433	375,052,000	52,985
1865.....	17,289	490,000,000	28,341

Here the increase in exports and imports keeps pace with railway development from 1833 to 1845, falls below it during the enormous multiplication of railways and the railway distress from 1845 to 1850, rises again to the former level in 1855, and outstrips it after that year, aided by the lowering of fares and the greater facilities for through booking and interchange of traffic. I cannot think that this correspondence within the two increases is accidental, especially as I shall show that it exists also in France.

But, it may be said, how do exports and imports depend on the development of the railway system? I answer, because they depend on the goods traffic; and the goods traffic increases visibly with the increase of railway mileage and the perfecting of railway facilities. Goods traffic means raw material and food brought from ports, or mines, or farms, to the producing population, and manufactured articles carried back from the producers to the inland or foreign consumers. The exports and imports bear a variable but appreciable proportion to the inland traffic. Every mineral railway clearly increases them; every agricultural railway increases them less clearly but not less certainly. *Hence I claim it as an axiom, that the commerce of a country increases in direct proportion to the improvement of its railway system, and that railway development is one of the most powerful and evident causes of the increase of commerce.*

Now, let us turn to the benefits which railways have conferred on the working classes. For many years before 1830 great distress had prevailed through the country. Mr. Molesworth, in his "History of the Reform Bill," says that it existed in every class of the community. "Agricultural laborers were found starved to death. In vain did landlords abate their rents and clergymen their tithes; wages continued to fall till they did not suffice to support existence." Innumerable petitions were presented from every county in England, stating that the distress "was weighing down the landholder and the manufacturer, the shipowner and the miner, the employer and the laborer." Trade and commerce were standing still while population was rapidly increasing at nearly the same rate as during the most busy and prosperous period of the French war. The increase from 1801 to 1861 is given in the census:—

ENGLAND AND WALES.

Year.	Popula- tion.	Inc. per ct. for 10 years.	Year.	Popula- tion.	Inc. per ct. for 10 years.
1801.....	8,892,536	11	1841.....	15,914,148	14
1811.....	10,164,256	14	1851.....	17,927,609	13
1821.....	12,000,236	18	1861.....	20,066,224	12
1831.....	13,896,797	16			

The increase during the ten years from 1821 to 1831, which included so much distress, was no less than 16 per cent., distributed pretty uniformly between the agricultural and manufacturing counties, and in itself almost a sufficient cause for the distress. But what has happened since? Increased facilities of transit led to increased trade; increased trade gave greater employment and improved wages; the diminution in the cost of transit and the repeal of fiscal duties cheapened provisions; and the immense flood of commerce which set in since 1850 has raised the incomes and the prosperity of the working classes to an unprecedented height. Railways were the first cause of this great change, and are entitled to share largely with free trade the glory of its subsequent increase and of the national benefit. But one portion of the result is entirely their own. Free trade benefited the manufacturing populations, but had little to do with the agriculturists. Yet the distress in the rural districts was as great or greater, than in the towns, and this under a system of the most rigid protection. How did the country population attain their present prosperity? Simply by the emigration to the towns or colonies of the redundant laborers. This emigration was scarcely possible till the construction

of railways. Up to that time the farm laborer was unable to migrate; from that time he became a migratory animal. The increase of population in agricultural counties stopped, or was changed into a decrease, and the laborers ceased to be too numerous for the work. To this cause is principally owing the sufficiency of employment and wages throughout the agricultural portion of the kingdom. If I may venture on a comparison, England was, in 1830, like a wide-spreading plain flooded with stagnant waters, which were the cause of malaria and distress. Railways were a grand system of drainage, carrying away to the running streams, or to the ocean, the redundant moisture, and restoring the country to fertility and prosperity.

VI.—RAILWAYS IN FRANCE.

In turning from England to France we enter a country completely different in its railway organization. In England everything is left to individual enterprise and independent companies. In France nothing can be done without the aid of the government. They tried the English system, and failed, just as they tried parliamentary government and failed. The independent railway companies broke down, and it was found absolutely necessary to change to a *regime* of government guarantees and government surveillance, suited to the genius of the French people, and under which they regained confidence and prosperity.

Before the introduction of railways France possessed an extensive system of water communication, which is now of the following extent:—

	Miles.
Navigable rivers.....	4,820
Canals.....	2,880
	<hr/>
Total.....	7,700

by which goods were conveyed at very reasonable rates, varying from 1d. to 2d. per ton per mile, or about half the English charges. But the delays were very great; three or four months for a transit of 150 miles was quite usual. And the canals paid scarcely 1 per cent. dividend, while their English cotemporaries were paying 5 to 20 per cent. .

Communication by road was also cheaper, but slower, than in England. The passengers paid from 1½d. to 3d. per mile, instead of the 3d. to 6d. paid in England. But they only traveled five to six miles an hour instead of the English eight to ten. Goods paid by road about 3d. per ton per mile for ordinary conveyance, and 6d. for quick despatch, being less than half the English charges. The distances in France were greater than in England, the commerce was less, and labor and food were cheaper; thus fully accounting for the difference.

Tramways were introduced into France in 1823, by the construction of a line of eleven miles from the coal mines of St. Etienne, and this was followed by two much longer lines of a similar character, which were opened by sections between 1830 and 1834. They are dignified in French books with the title of railways, but they were really nothing but horse tramways, and were sometimes even worked by oxen.

The success of the Manchester and Liverpool railway provoked some real though short railways in France, especially those from Paris to St. Germain and to Versailles. But in 1837 only 85 miles had been opened, against nearly 500 in England. In 1837 and 1838 the French Chambers

threw out a scheme of their government for the construction by the State of an extensive system of railways, but granted concessions to private companies for lines to Rouen, Havre, Dieppe, Orleans, and Dunkerque. These lines were abandoned for a time, in 1839, for want of funds.

In this emergency Mr. Locke, the great English engineer, restored the fortunes of French railways. Assisted by the London and Southwestern company, and Mr. Brassey, and with subventions from the French Government, and subscriptions from English shareholders, and a powerful corps of English navvies, he recommenced, carried through the line from Paris to Rouen, and from Rouen to Havre, and fairly gave the start to railway enterprise in France.

In 1842 a new law was passed, by which the State undertook the earth-works, masonry, and stations, and one-third of the price of land; the departments were bound to pay by instalments the remaining two-thirds of the land; and the companies had only to lay down rails, maintain the permanent way, and find and work the rolling stock. *It was intended that three-fifths of the total cost should be borne by the State and departments, and two-fifths by the companies.* Under this system of subventions, a number of concessions were made, the shares rose to 50 per cent. premium, and in 1848 a total of 1,092 miles had been opened. The revolution of 1848 was a terrible shock to their credit, and shares went down to half their value. Many lines became bankrupt and were sequestrated, and for three years fresh concessions were entirely stopped. But the concessions already made were slowly completed, and by the end of 1851 France had opened 2,124 miles against 6,889 opened in the United Kingdom.

In 1852 the Emperor took French railways in hand, and by a system of great wisdom, singularly adapted to the French people, he put an end to the previously feeble management, and launched into a bold course of railway development. The French public shrank from shares without a guarantee; he gave a State guarantee of 4 or 5 per cent. interest. The French public preferred debentures to shares; he authorized an enormous issue of debentures. The companies complained of the shortness of their concessions; he prolonged them to a uniform period of ninety-nine years. At the same time he provided for the interest of the State by a rigid system of government regulation and audit. And, lastly, coming to the conclusion that small companies were weak and useless, he amalgamated them into six great companies, each with a large and distinct territory; and able, by their magnitude, to inspire confidence in the public, and aid the government in the construction of fresh railways. This vigorous policy was very soon successful. Capital flowed in rapidly, construction proceeded with rapidity, and between the end of 1851 and 1857 the length of the railways opened was increased from 2,124 miles to 4,475, or more than doubled. England at that time had opened 9,037 miles.

France was now exceedingly prosperous. *Her exports and imports had increased from £102,000,000 in 1850, to £213,000,000 in 1857, or more than 100 per cent in seven years.* The six great companies were paying dividends which averaged 10 per cent.; and the government guarantee had never been needed. Railways united all the great towns and ports, and met the most pressing commercial wants. But the Emperor was not satisfied. France, with double the territory of England, had only half the railway accommodation, and wide districts between all the trunk lines were totally unprovided with railways. The government en-

gineers of the *ponts et chaussées* were prepared with plans and estimates for 5,000 miles of lines, which had been inquired into, and officially declared to be *d'utilité publique*, i. e., a public necessity. The country districts clamored for these lines. But how were they to be made? The public were not prepared to subscribe for them, the government could not undertake them, and the great companies were too well satisfied with their 10 per cent. dividend to wish to endanger it by unremunerative branches.

The plan of the Emperor was intricate but masterly. He said to the companies: "You must make these lines. The 4,520 miles of railway already made shall be a separate system for the present, under the name of *Ancien Réseau*, the old lines. You no longer require the guarantee of the State for these lines. But I will give you an extension of the ninety-nine years of your concessions, by allowing them to commence at later dates; beginning with 1852 for the Northern Company, and at various dates for the rest, up to 1862, for the Southern Company. I also engage that £9,000,000 sterling of the net revenue of these old lines shall for ever be divisible among the shareholders, without being liable for any deficit of the extension lines, an amount which will give you a clear and undefeasible dividend of 6 to 8 per cent.; with a strong probability—almost a certainty—of getting much more from surplus traffic."

"Next the new lines, 5,128 miles in length, shall be a separate system, under the name of *Nouveau Réseau*, or extension lines. Their estimated cost is £124,000,000, and you, the companies, may raise this sum by debentures, on which the government will guarantee 4 per cent. interest, and .65 sinking fund for the paying them off in fifty years. Any extra cost you must pay yourselves."

These, in their briefest possible form, are the terms on which the Emperor imposed an average of nearly 1,000 miles per company on the six great companies of France. They were accepted with considerable reluctance. Their effect has been to lower the value of the shares of the great companies, for the bargain is considered disadvantageous. The companies cannot borrow at less than 5.75, so losing 1.10 per cent. per annum on every debenture; and as the lines cost more than the £124,000,000, the overplus has been raised by the companies by debentures, for which they alone are responsible. But on the other hand, they get an immense amount of fresh traffic over their old lines, which must ultimately more than repay this loss. English railways would be thankful if their extensions cost them so little.

In the following years other lines were added, with similar guarantees and with considerable subventions from the State, and in 1863 an additional series of lines, 1,974 miles in length, were imposed on similar terms, but with some modifications of the conventions with two of the weakest companies.

Besides the government lines, the Emperor encouraged to the utmost the efforts of the departments, and in July, 1865, a law was passed respecting *chemins de fer d'intérêt local*, which authorized departments and communes to undertake the construction of local railways at their own expense, or to aid concessionaires with subventions to the extent of one-fourth, one-third, or in some cases one-half the expense, not exceeding £240,000.

Not content with passing this law, the minister of public works, in the very next month wrote to the *prefets* of the 88 departments of France,

to acquaint them fully with its provisions, and to invite them to communicate with their councils general, and deliberate upon the subject. The result was that sixteen councils requested their prefects to make surveys and inquiries to ascertain what lines would be advisable. 32 departments authorized their prefects to prepare special plans, and even to make provisional agreements with the companies to carry out lines, subject to confirmation by the councils. Two of these made immediate votes, viz., the department of Ain, £56,000, and Herault, £260,000, for lines which they approved. A third, the department of Calvados, voted subventions amounting to £1,000 per mile for one line, and £2,000 per mile for another line. Besides, these five departments put railroads into immediate execution by contracts with independent companies. Among these were :

	Subvention.
Saone et Loire.....	£14,000
“ (besides the land).....	40,000
Manche (with an English company, and including land).....	40,000
Rhone	240,000
Tarn	171,000

By these measures the Emperor has brought up the concessions to the following total :—

	Miles.
<i>Ancien Reseau</i> , or old lines.....	5,027
<i>Nouveau</i> “ or extension lines.....	7,565
	12,592

Being very nearly the length of our constructed lines in 1864.

But of this mileage there has been constructed up to the present time only..... 8,134

Leaving still unconstructed..... 4,458

being one-third of the whole concessions. Of this, 1,800 miles are now being constructed, and 1,600 miles are expected to be opened by the end of 1867.

Hence the lines constructed in France up to and including 1865, are 8,134 miles, or about the same length as the lines constructed in the United Kingdom to the end of 1865 ; so that France is ten years behind England in actual length of railways constructed, and at least fifteen years behind England if her larger territory and population are taken into account ; and I must add that France would have been very much farther behind had it not been for the vigorous impulse and the wise measures of the Emperor Napoleon.

The progress of completion from 1837 to the present time is shown in the following table :—

Year.	MILES CONSTRUCTED.	Average annual	
		Miles open.	Increase.
1837.....	85	}	84
1840.....	338		
1845.....	508	}	259
1850.....	1,807		
1855.....	3,315	}	301
1860.....	5,586		
1865.....	8,134	}	509

This shows the insignificant rate of progress up to 1845, and the larger but still slow progress up to 1855. From that time the effect of the Emperor's policy becomes visible in the increased rate of progression. It is expected that between 1852 and 1872 more than 9,500 miles will have been opened, quadrupling the number constructed in the previous twenty years, and contributing in the highest degree to the prosperity and wealth of the French nation.

Railway history in France may be briefly summed up in four periods:

1. The period of independent companies, from 1831 to 1841.
2. The period of joint partnership of the State and the companies, from 1842 to 1851.
3. The period of Imperial amalgamations and guarantees, from 1852 to 1857.
4. The period of guaranteed extension lines from 1858 to the present time.

VII.—COST AND RESULTS OF FRENCH RAILWAYS.

The French system of railway organization is worthy of attentive study. It is in many points novel to an Englishman; it is often characterized by remarkable talent; and some of its regulations are very instructive and worthy of imitation.

In extent the French lines are far inferior to the English, whether judged by the area or population of the two countries.

COMPARISON BY AREA.

Country.	Area in Square Miles.	Railway Mileage. 1865.	Square Miles per Mile of Railway.
United Kingdom.....	120,927	13,289	9
France.....	211,852	8,134	26

COMPARISON BY POPULATION.

Country.	Population, 1861.	Railway Mileage. 1865.	Population per Mile of Railway.
United Kingdom.....	29,321,000	13,289	2,206
France	37,382,000	8,134	4,595

Hence, measured by area, France has only one-third of the railway accommodation, and measured by population only one-half of the railway accommodation of the United Kingdom.

The capital authorized and expended to the 31st December, 1865, was as follows:—

CAPITAL AUTHORIZED.

<i>Ancien Reseau</i> , or old lines.....	£151,000,000
<i>Nouveau</i> " or extension lines.....	209,000,000—£360,000,000
Including 64,000,000 subventions.	

CAPITAL EXPENDED, 1866.

Debentures.....	£178,700,000
Shares.....	54,800,000
Subventions	27,500,000—£261,000,000

So that the French companies borrow more than three times the amount of their share capital; reversing the English rule, of borrowing only one-third of the share capital. But if we consider preference capital as a

second mortgage, the English practice is to borrow an amount equal to the ordinary share capital. This, however, is still a long way from the French regulations.

The capital not paid up is nearly £100,000,000. Of this nearly one-half will be required in the next three years for lines approaching completion.

The cost per mile of French railways is as follows:—

<i>Ancien Réseau</i>	\$30,650
<i>Nouveau</i> "	27,350

As the nouveau reseau is almost entirely composed of single lines, this does not show very great cheapness of construction. We are making our country lines much cheaper, particularly in Ireland and Scotland.

The effect of railway competition with canals was the same as in England. The canal rates were reduced to one-third of their former amount, and the canal traffic has increased instead of diminishing. The average railway fares and rates are stated by M. Flachet, in his work on railways, to be 6 to 7 centimes for each passenger, and sou per kilometre, being 1d. to 1½d. per mile, as compared with 1½d. per mile, the average on English railways.

The increase of traffic since 1850 is stated in the official returns as follows:—

INCREASE OF TRAFFIC.

Year.	Total Receipts.	Average Annual Increase.	Average Annual Increase for Fifteen Years.
1850	£3,824,400	} £1,307,000 } } 1,217,000 } } 1,192,000 }	} £1,238,400 }
1855	10,358,000		
1860	16,443,000		
1865	22,400,000		

Thus the increase has been more equable than in England, but smaller in amount, showing an average of £1,238,400, against £1,423,000 in England. But I see it stated in the railway papers that the first nine months of 1866 show much more than the usual increase.

M. Flachet gives a calculation of the saving to the nation by railway conveyance, which he makes a minimum of £40,000,000 a year. But it is based on the supposition that all the new trade would have been carried by road, which is obviously untenable. Probably £25,000,000 to £30,000,000 is a safer estimate. A writer in the "Dictionaire du Commerce" goes into elaborate calculations of the money-saving arising out of the greater rapidity of railways, and values it at £8,000,000, on the basis that the time of a French citizen is worth 5d. an hour. I give the passage entire:—

"In France, the number of kilometres traveled by passengers in 1856 was 2,200,000,000. In traveling this distance they would have spent 290,000,000 hours, while they have only been 50,000,000 hours on the railway. The saving in time of traveling by railway has therefore been 240,000,000 hours, which, at the moderate price of 5d. per hour, represent an economy of 120,000,000 frs. Besides this, the time lost in stoppages at small inns (auberges) used to exceed that spent in traveling, and hence on this head alone we may calculate on a saving of more than 100,000,000 frs. But even if we should reduce this valuation to 80,000,000, or still lower to 60,000,000 frs., there cannot be any doubt that the saving to the traveler in the matter of time alone exceeds 200,000,000 frs. (£8,000,000)."—Vol. i., p. 638.

Passing from individuals to commerce, the effect of railways has been very marked, and is warmly acknowledged by the principal French writers. The following table shows the progress of French trade:—

INCREASE OF EXPORTS AND IMPORTS.			
Year.	Total Exports and Imports.	Increase per Cent.	Increase per Cent. per Annum.
1840	£82,520,000	—	—
1845	97,080,000	15.	3.
1850	102,204,000	5.	1.
1855	173,076,000	50.	10.
1860	232,192,000	34.	6.8
1865	293,144,000	26.25	5.25

The revolution of 1848 accounts for the small increase between 1845 and 1850, but it is plain that the great increase in French commerce was between 1850 and 1860, contemporaneously with the great development of railways. *When traveling in France I have always heard railways assigned as the cause of their present commercial prosperity.*

The proportion which the exports and imports bore to the means of communication is shown in the following table:—

PROPORTION OF EXPORTS AND IMPORTS TO RAILWAYS AND NAVIGATION.			
Year.	Navigations (7,700 miles), and Railways.	Exports and Imports.	Exports and Imports per Mile Open.
1840	8,264	£82,520,000	£9,985
1845	8,547	97,080,000	11,358
1850	9,507	102,204,000	10,750
1855	11,015	173,076,000	15,712
1860	13,286	232,192,000	17,476
1865	15,830	293,144,000	18,518

Here there is a steady rise in the amount per mile, checked only by the revolution of 1848. But the principle that there is a distinct correspondence between means of communication and the exports and imports is already shown.

The effect of railways on the condition of the working classes has also been very beneficial. The extreme lowness of fares enables them to travel cheaply, and the opportunity is largely used. The number of third class passengers in France is 75 per cent. of the total passengers, against only 58 per cent. in England (M. Flachet, p. 60). The result of these facilities of motion has been an equalization of wages throughout the country, to the great benefit of the rural populations. M. Flachet says:—

“Railways found in France great inequality in the wages of laborers; but they are constantly remedying it. Wherever they were constructed in a district of low wages, employment was eagerly sought. The working classes rapidly learnt to deserve high wages by the greater quantity of work done. Agriculture had been unable to draw out the capabilities of its workmen, and was for the moment paralyzed by want of hands; but industry developed fresh resources. The total amount of work done was considerably increased all over the country. The difficulties of agriculture were removed by obtaining in return for higher wages a larger amount of work than before, and also because machines began to be used in cultivation. Everywhere it was evident that increased energy accompanied increased remuneration. This is the point in which railways have most powerfully increased the wealth of France. The moral result of this improvement in the means of existence of the working class has been to diminish the distance which separates the man who works only for himself from the man who labors for a master. In the education of the workman's children, in his clothing, in his domestic life, and even in his amusements, there is now an improvement which raises him nearer to his master.”—pp. 78 and 79.

I am sure we shall all rejoice at this evidence of the benefits conferred by railways upon the working classes of that great neighboring nation. I wish there was time to give you additional extracts, showing the immense services of railways to the industry of France, showing that France was kept back by the difficulty of communication, by the immense distances to be traversed and the impossibility of conveying cheaply and rapidly the raw materials of manufactures. Railways have supplied this want, and have given a new impetus to production and new outlets for the produce.

Turning to the shareholders, there are some curious facts which surprised me not a little. The popular notion is, that in France railway traffic bears a much higher proportion to capital expended than in England. The phrase "They manage these things better in France" is forever on the lips of the British shareholder when he talks of his own paltry $4\frac{1}{2}$ per cent. dividend, or of the $8\frac{1}{2}$ per cent. gross receipts. The world in general believe that a 10 or 12 per cent. French line, like the Orleans of France, really has a traffic of at least that amount. But this is an entire mistake. The gross traffic receipts of France are now 9.6 per cent. on the share and debenture capital, or 1 per cent. more than in England. And the net receipts, after deduction of 45 per cent. working expenses, are now 5.28 per cent. on the total share and debenture capital, being .82 or about four-fifths per cent. higher than in England. Yet the French companies pay an average dividend of 10 per cent., while the English pay only the natural dividend of $4\frac{1}{2}$. Here are the figures, for the benefit of the sceptical:—

AVERAGE RECEIPTS AND DIVIDENDS PER CENT.

Name of Company.	1859.	1861.	1865.
Gross receipts.....	10.5	11.0	9.6
Net profits.....	5.7	6.2	5.28
<i>Dividends of Great Companies:</i>			
Nord.....	15.	16.5	17.87
Orleans.....	18.	20.	11.2
Midi.....	4.	10.	8.
Ouest.....	7.5	8.5	7.5
Est.....	3.13	8.	6.6
Mediterranee.....	10.6	15.	12.
Average.....	10.54	13.	10.53

Compare these figures with those for the English lines given above. You will see the remarkable correspondence between the gross and net receipts and the very remarkable dissimilarity in the dividends. How is this accounted for?

Look at the table of capital expended. Disregarding the £27,500,000 subventions, as corresponding to the *dixieme* tax paid by the companies, there is £233,000,000 share and debenture capital, out of which a portion of the debentures are charged to capital under the conventions for the extension lines. Being for new railways they have not yet been transferred to the revenue account. Hence the interest-bearing capital reduced, and the interest itself increased.

The large amount of debentures now comes into play, on which there is paid from 5 to $5\frac{1}{2}$ per cent., leaving an overplus to accumulate for the shares, so raising the interest on shares to nearly 7 per cent.

But this is not enough. In 1863 the State bound itself to contribute to certain lines annual subventions, which in 1865 came to £551,000, and the State also paid during the same year, in respect of their guarantees of the debentures in the *nouveau réseau*, £1,320,000, making a total subvention in 1865 of £1,871,000, an amount sufficient to pay more than 3 per cent. on the share capital of £54,800,000. The guarantee of £1,220,000 on the *nouveau réseau*, however, is not an absolute subvention, as it will be repayable gradually by the companies when their income exceeds a fixed amount. It is therefore a loan by the State, repayable on the occurrence of a contingency, and at an uncertain date.

Thus the original interest of 5.28 per cent. on the share and debenture capital becomes 10 per cent. to the shareholder. It is a wonderfully clever arrangement and would be exceedingly palatable to Great Eastern or even Great Northern shareholders.

But consider the difference which this shows in the ideas of the two countries. In England it would never be borne for an instant that six great companies, say the London and Northwestern, Great Western, Midland, and others, should receive 10 per cent. dividend and yet obtain from the State annual subventions and guarantees amounting to £1,800,000. No ministry dare propose such a job. The reform agitation would be nothing to the clamor with which it would be greeted; and yet in France it is the most natural thing possible. Nobody says a word against it. Nay, the feeling of the French companies and the popular opinion is that these poor 10 per cent. shareholders have been badly used, and that their legitimate 12 or 15 per cent. from the trunk lines ought not to have been lessened.

One characteristic of the French systems is the absence of competition, and this is opposed to all our ideas of freedom of communication. The Northern Company monopolizes the whole traffic between Calais and Paris. The Mediterranean Company monopolizes the whole traffic between Paris and Marseilles, a traffic of extraordinary importance and value. An attempt made two years ago by another company to obtain an extension to Marseilles and to establish an alternative route was rejected by a government commission after a very long inquiry. The consequence of this system is a great concentration of traffic in a small number of trains, to the profit of the companies and to the inconvenience of the traveler. There are in England, between places like Liverpool and London, about three times as many trains as there are in France, between Marseilles and Paris. And besides this, goods are sent less rapidly in France and delivered with less punctuality.

But there is a great deal to be said in defence of the French system. It avoids the duplicate lines necessary for competition, which France could not well afford. It keeps the companies prosperous and able to aid the government in railway extension. It is not an irresponsible monopoly, able to charge high prices to its customers, but a strictly regulated monopoly, with its tariff fixed by government at the lowest prices that will be remunerative. It is like the system of our own Metropolitan Gas and Water Companies, which enjoy a monopoly within defined districts, on terms settled by the law and revised from time to time in the interest of the public. The French government appoints commissioners of inquiry to examine into any defect or to consider improvements, and they report to the minister of public works, who has the power of making reg-

ulations which are binding on the companies. The last commission is a good instance. In February, 1864, the minister of public works issued to the companies a circular suggesting several points which required improvement, and the commission was appointed to consider their answers. The points discussed were:—

1. The adoption of a means of communication between the guard and engine-driver. This was made obligatory on the companies.

2. A means of communication between passengers and the guard. This was accepted by the companies.

3. The consumption by the locomotives of their own smoke. This was ordered to be carried out within two years.

4. The addition of second and third class carriages to express trains. The recommendation of the commission was accepted by the companies.

5. Separate carriages for unprotected females.

6. The commission demanded that on the great lines the speed of goods trains should be increased from 60 miles to 120 miles, without any increase of tariff. This very important question was referred to a sub-committee for further examination and for hearing objections.

From these details it is evident that the interests of the public are well looked after.

I should add that there is a continuous audit of the accounts of the companies by government accountants, who attend from week to week at the companies' offices for that purpose.

I will at present mention only one other point in French railway law—that the government has the power of purchasing any line of railway after fifteen years from its first concession. The price is to be fixed by taking the amount of the net profits of the seven preceding years, deducting the two lowest years and striking the average of the remaining five years. The government is then to pay to the company for the remainder of the concession an annual rent-charge or annuity equal to the average so determined, but not less than the profits of the last of the seven years. This mode of purchase appears preferable to the English law, since it does not require the creation of any new rentes or consols, and I commend it to the notice of Mr. Galt.

I have mentioned these prominent features of the French law in the hope that they may be useful in suggesting improvements in the English system.

Why should we not vest in the President of the Board of Trade a power of making and enforcing regulations for the public safety and convenience? Why should we not introduce more frequent railway commissions to consider important questions and recommend to the President of the Board of Trade or to Parliament? Why should we not have a modified system of audit, and a registration of shares and debentures?

VIII.—RAILWAYS IN BELGIUM AND HOLLAND.

Belgium is one of the most striking instances of the benefit of railways. In 1830 she separated from Holland, a country which possessed a much larger commerce and superior means of communication with other nations by sea and by canals. Five years later the total exports and imports of Belgium were only £10,800,000, while those of Holland were double that amount. But in 1833 the Belgian government resolved to

adopt the railway system, and employed George Stephenson to plan railways between all the large towns. *The law authorizing their construction at the expense of the State passed in 1834, and no time was lost in carrying it out. Trade at once received a new impetus, and its progress since that time has been more rapid than in any other country in Europe.* The following table shows the activity with which the lines were constructed. We must remember that Belgium contains only one-tenth of the area of the United Kingdom, and that to make a fair comparison with our own progress we must multiply the table by ten.

MILES CONSTRUCTED.		
Year.	Miles Open.	Increase per annum Miles.
1839.....	185	25
1845.....	335	
1853.....	720	48
1860.....	1,037	45
1864.....	1,350	78

Hence, the progress for a State of the size of the United Kingdom would have been—

	Miles a Year.
1839 to 1845.....	250
1845 to 1853.....	480
1853 to 1860.....	450
1860 to 1864.....	750

a rate of increase which is as great or greater than our own.

The results on commerce are shown in the following table:—

INCREASE OF EXPORTS AND IMPORTS.			
Year.	Exports and Imports	Increase per Cent.	Increase per Cent. per Annum.
1835.....	£10,760,000	45.72	11.43
1839.....	15,680,000		
1845.....	26,920,000	71.4	11.9
1853.....	47,760,000	77.41	9.67
1860.....	72,120,000	51.	7.3
1864.....	97,280,000	35.88	9.

I need scarcely point out the extraordinary character of this increase, which is enormous in the first ten years, and far beyond either England or France, and is not inferior to us in the later period. In the thirty years from 1835 to 1864 Belgium increased her exports and imports nearly tenfold, while England increased hers only fivefold. If we had increased our commerce in the same ratio, the English exports and imports would now be a thousand million pounds sterling.

The proportion between exports and imports and means of communication is shown in the following table, which differs from those of England and France in the rapid increase per mile:—

PROPORTION OF EXPORTS AND IMPORTS TO RAILWAYS AND NAVIGATIONS.

Year.	Canals (910 Miles) and Railways Open.	Exports and Imports.	Exports and Imports per Mile Open
1839.....	1,055	£15,680,000	£14,862
1845.....	1,205	26,920,000	22,340
1853.....	1,590	47,760,000	30,037
1860.....	1,907	72,120,000	37,818
1864.....	2,220	97,280,000	42,919

This enormous increase of Belgian commerce must be ascribed to her wise system of railway development, and it is not difficult to see how it arises. Before railways, Belgium was shut out from the continent of Europe by the expensive rates of land carriage and her want of water communication. She had no colonies and but little shipping. Railways gave her direct and rapid access to Germany, Austria, and France, and made Ostend and Antwerp great continental ports. One of her chief manufactures is that of wool, of which she imports 21,000 tons, valued at £2,250,000, from Saxony, Prussia, Silesia, Poland, Bohemia, Hungary, Moravia, and the southern Provinces of Russia; and returns a large portion in a manufactured state. She is rapidly becoming the principal workshop of the continent, and every development of railways in Europe must increase her means of access and add to her trade.

Now look at Holland, which in 1835 was so much her superior. Holland was possessed of immense advantages in the perfection of her canals, which are the finest and most numerous in the world; in the large tonnage of her shipping; in her access by the Rhine to the heart of Germany; and in the command of the German trade, which was brought to her ships at Amsterdam and Rotterdam. The Dutch relied on these advantages and neglected railways. The consequence was, that by 1850 they found themselves rapidly losing the German trade, which was being diverted to Ostend and Antwerp. The Dutch Rhenish railway was constructed to remedy this loss, and was partly opened in 1853, but not fully till 1856. It succeeded in regaining part of the former connection. But now observe the result. In 1839 the Dutch exports and imports were £28,500,000, nearly double those of Belgium. In 1862 they were £59,000,000, when those of Belgium were £78,000,000. Thus while Holland had doubled her commerce Belgium had increased fivefold, and had completely passed her in the race.

Before leaving Belgium I ought to mention the cheapness of fares on her railways, which have always been much below those on English lines; a further reduction has lately been made, and I see by a French paper that the results has been to increase the passenger receipts on the State lines for the month of April from 76,956 frs. in 1865 to 198,345 frs. in 1866, of which 168,725 frs. was from third and fourth class passengers; a fact which is in favor of the plan of Mr. Galt. But it must be remembered that Belgium is the most densely populated country in the world, having 432 inhabitants to the square mile, while the United Kingdom has only 253, and England and Wales 347. A system which will pay admirably between large cities at short distances from each other, and on lines which cost little to construct, might break down completely on lines of expensive construction in more thinly inhabited districts. Mr. Galt takes his instances from railways in dense populations, and applies the rules thus obtained to railways which are under totally different conditions, and I fear that this vitiates in a great degree the soundness of his conclusions.

IX.—RAILWAYS IN THE UNITED STATES.

In any paper on foreign railways it is impossible to omit the United States, a country where they have attained such gigantic proportions. The increase of United States lines is as follows :

Year.	MILES CONSTRUCTED.	Total mileage.	Inc. per annum. Miles.
1830.....	41	215
1840.....	2,197	
1845.....	4,522	465
1850.....	7,475	
1855.....	17,398	590
1860.....	28,771	
1864.....	33,860	1,984
			2,274
			1,272

The mileage here shown is something enormous: four time that of France, two and a half that of England, and nearly as large as the total mileage of the United Kingdom and Europe, which is about 42,000 miles.

In so young a country inland traffic gives these lines the greater part of their employment, and there are no masses of expensive manufactured goods as in England or Belgium to swell the total value of foreign trade. Foreign commerce is still in its infancy, but an infancy of herculean proportions, as the following table shows:—

INCREASE OF EXPORTS AND IMPORTS.

Year.	Total exports and imports.	Increase per cent.	Inc. per ct. per annum.
1830.....	£31,000,000	47.60	3.40
1844.....	45,759,000		
1850.....	68,758,000	50.00	8.33
1855.....	111,797,000	62.60	12.52
1860.....	158,810,000	42.00	8.40

The advance in the annual increase is very striking, being from 3½ per cent. per annum in the infancy of railways, to 8 and 12 per cent. when their extension was proceeding rapidly. Before the introduction of railways America possessed a very extensive system of canals, which amounts to nearly 6,000 miles. At the present time both canals and railways are crowded with traffic. The following table shows the relation between the growth of trade and the increase of means of communication:—

PROPORTION OF EXPORTS AND IMPORTS TO RAILWAYS AND CANALS.

Year.	Canals (6,000 miles) and railways open.	Total exports and imports.	Exports and imports per mile.
1830.....	6,040	£31,000,000	5,130
1844.....	10,310	45,759,000	4,437
1850.....	13,475	68,758,000	5,102
1855.....	23,398	111,797,000	4,778
1860.....	34,770	158,810,000	4,567

Thus, in the United States, as well as in England, France, and Belgium, the exports and imports bear a distinct relation to the miles of communication open, but lower in amount than in the European countries, as was only likely from the thinner population.

Vast as is the mileage of the American railways it is by no means near its highest point. The lines in construction, but not yet completed, are stated to be more than 15,000 miles in length, a larger number than the whole mileage of the United Kingdom, completed and uncompleted.

The manner in which these lines are made is very remarkable. The United States are very thinly populated, not containing on an average more than 32 persons per square mile in the Northern States, and 11 in the Southern. Even the most populous Northern States have only 90 persons per square mile, while England and Wales have 347 per square mile. A less expensive railway, of smaller gauge, was, therefore, necessary, and the lines are almost invariably "single tracks." Their first cost have averaged from £7,000 up to £15,000 per mile, or about one-third of the expenditure in England. Of course they are very inferior in weight of rails and in sleepers, ballasting, stations, and efficiency. Even this expense was difficult to provide for where the inhabitants are so widely scattered. But in America the greatest encouragement is given to railroads, and every facility is afforded for their extension, as they are considered the most important sources of wealth and prosperity. Shares are taken largely by the inhabitants of the district traversed, land is often voted by the State, and the cities and towns find part of the capital by giving security on their municipal bonds.

I must not omit to mention the great Pacific railways, one of which is now being constructed from the State of Missouri for a distance of 2,400 miles across Kansas, Nebraska, Utah, and Nevada to San Francisco, in California. It receives from the general government subsidies of £3,300, £6,600, or £9,900 per mile, according to the difficulty of the ground, besides enormous grants of land on each side of the line. When this railway is completed the journey from Hong Kong to England will be made in thirty-three days instead of the present time of six weeks, and it is anticipated that a large portion of our Chinese traffic will pass by this route.

No one can study the United States without being struck by the great railway future which lies before them, when their immense territories are more thickly peopled, and their mineral resources and manufactures have been developed. The distances to be traversed are so vast, and the traffic to be carried will be so enormous that the railways of the United States will far exceed in extent, and in the trade which will pass over them, anything that has hitherto been known in the history of the world.

X.—RAILWAYS AND FREE TRADE.

In the preceding sections I have endeavored to describe the progress of railway extension in England, France, Belgium, and the United States, the four countries where it has received the greatest development, and I have pointed out the very great increase of commerce and national prosperity which have been its result. But in the case of England, I am bound to meet a very probable objection. I shall be asked, why do you attribute this increase of commerce mainly to railways? Was it not caused by free trade?

The general opinion undoubtedly is, that free trade is the principal cause of the immense increase since 1842 of English commerce. We see this opinion expressed every day in newspapers and reviews, in speeches and parliamentary papers. I hold in my hand a very able memorandum, lately issued by the Board of Trade, respecting the progress of British commerce before and since the adoption of free trade, in which the same view is taken, and in which the statistics of the exports and imports since 1842 are given as mainly the result of free trade. It is true that there is a reservation, acknowledging "that the increase of productive power and other causes have materially operated in effecting this vast development." But in the newspaper quotations and reviews this reservation was left out of sight, and the striking results recorded in the memorandum were entirely ascribed to free trade.

While acknowledging to the full the great benefits and the enlightened principles of free trade, I have no hesitation in saying that this popular view is a popular exaggeration, which it is the duty of statisticians to correct, and I think that my reasons will be considered satisfactory by this Society. In the first place, the development of English commerce began in 1834, before free trade, but simultaneously with railways; and between 1833 and 1842 the exports and imports increased from a stationary position at £85,500,000 to £112,000,000, or 31 per cent. In the next place, from 1842 till 1860 England was the only country which adopted free trade. If England had also been the only country that made such enormous progress we might safely conclude that free trade was the chief cause of so great a fact. But this is not the case. England is only one of several countries which made an equal advance during the same period, and none of those countries, except England, had adopted free trade. The total increase of exports and imports from 1842 to 1860 in the three first countries described in this paper, and from 1844 to 1860 in the United States, was as follows:—

Country.	1842.	1860.	Increase per cent.
England.....	£112,000,000	£375,000,000	234
France.....	86,280,000	232,200,000	169
Belgium.....	19,400,000	72,120,000	272
	1844.		
United States.....	45,757,000	158,810,000	305

Thus, the English rate of increase is only third in order, and is exceeded both by Belgium and the United States. If the latter country is objected to on account of its rapid growth in population by immigration, still Belgium remains, exceeding the English rate of increase by 36 per cent. Look at the argument by induction. Here are four countries under the same condition of civilization, and having access to the same mechanical powers and inventions, which far outstrip contemporary nations. It is a probable conclusion that the same great cause was the foundation of their success. What was that common cause? It could not be free trade, for only one of the countries had adopted a free trade policy. But there was a common cause which each and all of those four countries had pre-eminently developed—the power of steam—steam machinery, steam navigation, and steam railways. I say, then, that steam was the main cause of this prodigious progress of England as well as of the other three countries.

But I will go a step farther. Steam machinery had existed for very many years before 1830, and before the great expansion of commerce. Steam navigation had also existed for many years before 1830, and before the great expansion of commerce, and steam navigation was unable to cope with the obstacle which before 1830 was so insuperable, viz: *the slowness and expense, and limited capacity of land carriage.*

I come, then, to this further conclusion, that the railways which removed this gigantic obstacle, and gave to land carriage such extraordinary rapidity and cheapness, and such unlimited capacity, must have been the main agent, the active and immediate cause of this sudden commercial development.

This conclusion appears to become a certainty when I find, from the investigation through which we have traveled, that in every one of these four great examples, the rapid development of commerce has synchronised with an equal rapid development of railways—nay, that the development of commerce has been singularly in proportion to the increased mileage of railways—so that each expansion of the railway system has been immediately followed, as if by its shadow, by a great expansion of exports and imports.

But I will not leave the case even here. Consider what are the burdens which press upon trade and manufactures. If our merchants could be presented with that wondrous carpet of the Genii of the “Arabian Nights,” which transported whatever was placed upon it in one instant through the air to its farthest destination, overleaping mountains and seas and custom-houses, without expense or delay, we should have the most perfect and unburdened intercourse. But see what barriers and burdens there are in actual fact, when we trace the journey of the raw material, such as cotton or wool, to the British manufacturer, and its export as a manufactured article.

BURDENS UPON IMPORTS AND EXPORTS.

Raw Material—

1. Inland carriage to the sea.
2. Voyage to England.
3. Import duty.
4. Inland carriage of the manufacturer.

Manufactured Article—

5. Inland carriage to the sea.
6. Voyage to foreign country.
7. Import duty.
8. Inland carriage to the customer.

Here are eight distinct burdens or charges increasing the price of our manufactures to the foreign consumers. Out of these—

Four are inland carriage,

Two are navigation, and only

Two are custom house duties.

Now, except in the case of prohibitory duties, it was undoubtedly the case that, before the introduction of railways, inland carriage was the most expensive of these burdens. In countries unprovided with canals, a very few miles of road transport was an absolute prohibition. It is so in many parts of India, Spain, and Turkey at the present day. In countries provided with canals, rates were high, and transport slow, and always coming to a dead lock. Hence the relief afforded by railways,

both in cheapness and saving of time, was far beyond any relief by free trade in taking off moderate duties.

In a vast number of cases railways did more than cheapen trade, they rendered it possible. Railways are the nearest approach that human ingenuity has yet devised to that magic carpet of the "Arabian Nights," for which I ventured to express a wish.

For all these reasons I maintain that we ought to give railways their due credit and praise, as the chief of those mighty agents which, within the last thirty years, have changed the face of civilization.

XI.—RAILWAYS AND NATIONAL DEBTS.

In one important point the nations of Latin race have stolen a clear march upon the nations of Teutonic origin, of England, Germany, and the United States, by their appreciation and adoption for railways of the principle of a sinking fund. The idea owes its origin to the semi-Latin, semi-Teutonic intellect of Belgium. When the Belgian government, in 1834, projected a system of State railways, to be constructed with money borrowed by the State, they provided for the extinction of the loans in fifty years by an annual sinking fund. The amount borrowed was nearly £8,000,000 sterling, and the whole will be paid off in 1884, after which date the whole profits of the State lines, 352 miles in length, will become part of the revenue of the nation. But so good an investment are these lines that their present net income is £525,000 a year, and is increasing at a rate which promises in 1884 a net revenue of £960,000, *a sum which will be sufficient to pay the interest on the whole national debt, now £26,000,000.* Besides this, the conceded lines, 1,000 miles in length, will become amortized and become State property in 90 years from the beginning of their concessions, and the profits on a capital of more than £13,000,000 will then be available toward the State revenue.

This system was copied by France, and imitated from her by the other Latin nations, Spain, Portugal, and Italy, as well as by the non-Latin States of Austria and Holland. *All these countries, at the end of various terms of 99, 90, and 85 years will practically pay off a large portion of their national debt.* Improvident Spain will pay off about £40,000,000 out of her debt of £164,000,000. Heavily burdened Austria will practically abrogate something like £65,000,000 out of her debt of £250,000,000. Italy will wipe out a large portion of her debt of £176,000,000.

But the most remarkable example is France; and I will endeavor to explain as briefly as possible the working of the French system. In France the railways are conceded for 99 years, but it is one of the conditions of the grant that all the capital, whether in shares or debentures, shall be paid off within that term by an annual *amortissement*, or sinking fund. The small amount of this annual payment is very extraordinary. The French rate of interest is 5 per cent., and the annual sinking fund necessary to pay off 100 francs in 99 years is as nearly as possible .04. Put into the English form, for the sake of clearness, this means that the annual sinking fund necessary at 5 per cent. to redeem £100 in 99 years is only 1s. per annum. As debentures are issued in France for less than 99 years when part of the concession is run out, the amount of the sinking fund varies, but it is usually said to amount on the average to one-

eighth per cent. As the whole expended capital of French railways represented by shares and debentures, is £233,000,000, it follows that the total annual sinking fund paid by the French companies for the redemption of that sum is less than £300,000. The result is marvellous, that for £300,000 the French nation will acquire, in less than 99 years, an unencumbered property of £233,000,000 sterling. But this is not all. The railways represented by that £233,000,000 sterling produced in 1865 a net revenue of about £12,500,000. Before 1872 further railways will have been completed, which will be amortized at the same rate as their parent lines, and will produce before many years a net income of £4,000,000, making a total net income of the French railways £16,500,000. But the total charge of the French national debt in 1865 was only £16,000,000. So that France has now a system in operation which, in less than 90 years from the present time, will relieve the country from the whole burden of her national debt of nearly £500,000,000.

Is it allowable in me to ask, why are we doing nothing of the sort? When so many other nations are paying off by means of their railways a portion, or the whole of their national debts, why are we, with all our wealth and resources, to do nothing? A scheme of amortization suited to the habits of the English people, is perfectly possible, and the peculiar position of railway companies at the present moment renders it easy to carry out. I will say nothing about debentures, because a plan is now before the government dealing with them. But, I say, respecting Share Capital, that it would be perfectly practicable for the State to become the possessor of a large proportion of this stock in a comparatively short time, and at no great expense. An annual sinking fund of 5s. per cent. will pay off £100 in seventy-two years, reckoning only 4 per cent. interest. Hence, in seventy-two years, an annual sinking fund of £500,000 a year will pay off £200,000,000. The government duty on railways amounts to £450,000 a year, and will soon reach £500,000. My proposal would be to make this a sinking fund towards purchasing £200,000,000 of preference and other stock, and let it be invested annually by the Board of Trade, or by commissioners appointed for the purpose, like those appointed for the national debt. Instead of canceling each share as it is purchased, let it be held in trust for the nation, and the dividends applied every year in augmentation of the sinking fund. In this manner, at the end of about seventy-two years, £200,000,000 of preference and ordinary share capital would become the property of the nation, and its dividends become applicable to the interest of the national debt. As railway dividends average 4 to 4½ per cent., the dividends on the redeemed capital would pay the interest on more than £250,000,000 consols, and be equivalent to the redemption of that amount of our national debt.

I believe that this is a practical scheme. In a slightly different form it is now being carried out in France, Belgium and other continental States. I trust that before long we shall cease to be almost the only nation in Europe which does not act on the principle "*that railways are the true sinking fund for the payment of the national debt.*"

The advantages of such a sinking fund invested in consols are three-fold:

1. It would be invested annually in railway capital at a higher interest, and thus accumulate more rapidly.

2. It would have a different primary object, viz: the purchase of a State interest in railways, and would, therefore, be more likely to enlist popular feeling in favor of its maintenance.

3. It would be distinct and separate from the national debt, and not under the same control, and would, therefore, be less liable to be diverted to the financial necessities of the hour.

Perhaps it will be said that a railway sinking fund is unsuited to the character and habits of the English people. But surely it is our character to be prudent and to pay off encumbrances, and to adopt the best means of accomplishing that object. Surely it is not right in a great and wealthy and enlightened nation like England to incur the reproach of being spendthrift of her resources and reckless of her debts.

XII.—FURTHER RAILWAY EXTENSION.

England is undoubtedly the country in the world best provided with railways. The statistical comparison stood thus at the end of 1865:—

RAILWAYS COMPARED WITH AREA AND POPULATION.

Country.	Railway Miles Open.	Square Miles per Railway Mile.	Population per Railway Mile.
England and Wales.....	9,251	6½	2,186
1. Belgium.....	1,350	8	3,625
2. United Kingdom.....	13,289	9	2,206
3. Switzerland.....	778	19	3,257
4. Prussia and Germany (except Austria).....	8,589	20	3,525
5. Northern United States (except Kansas, Nebraska and Oregon)....	24,883	25	801
6. France.....	8,134	26	4,607
7. Holland.....	372	29	9,066
8. Italy.....	2,389	41	9,084
9. Austria.....	3,735	63	9,375
10. Spain.....	2,721	67	5,991
11. Portugal.....	419	87	8,555
12. Southern United States.....	10,300	92	1,025
13. Canada.....	2,539	136	987
14. India.....	3,186	287	42,572
Total of the 14 countries.....	82,495

But England has a much greater proportion of double lines, and a larger number of trains on each line; while, on the other hand, Belgium and other continental nations have lower fares and give greater accommodation to third and fourth class passengers. Both parties have something to learn—they to admit the principle of competition and increase the number of railways; we to provide cheap conveyance for the masses, without the clumsy device of excursion trains.

But now comes the question—do England and Belgium need further railways, or are they already sufficiently provided? It may partly be answered by the fact that in England there are about 3,500 miles authorized by Parliament which have not yet been made, and that in Belgium there are 450 miles (equal to 4,500 in England) conceded but not constructed. And we may also point to the circumstance that in England and Wales there were, in 1865, 6,081 miles of double line against 3,170 miles of single, showing that there is a want of cheap lines through

rural districts. A glance at the railway map will confirm this inference. The lines run in the direction of the metropolis or some great town, and there are few cross-country lines. The distance between the lines supports this conclusion. Deducting the manufacturing districts, which are crowded with a railway network, the remainder of the country gives an average of about fifteen miles between each mile of railway. The average ought not to be more than eight or ten miles.

The advantage of a railway to agriculture may be estimated by the following facts. A new line would, on an average, give fresh accommodation to three and a-half miles on each side, being a total of seven square miles, or 4,560 acres for each mile of railway. It would be a very moderate estimate to suppose that cartage would be saved on one ton of produce, manure, or other articles for each acre, and that the saving per ton would be five miles at 8d. per mile. Hence the total annual saving would be £768 per mile of railway, which is 5 per cent. interest on £15,000. Thus it is almost impossible to construct a railway through a new district of fair agricultural capabilities without saving to the landowner and farmer alone the whole cost of the line. Besides this, there is the benefit to the laborers of cheap coals and better access to the market. There is also the benefit to the small towns of being put into railway communication with larger towns and wholesale producers. And there is the possibility of opening up sources of mineral wealth.

Somebody ought to make these agricultural lines, even though they may not pay a dividend to the shareholder. But who is that somebody to be? The great companies will not take the main burden lest they should lower their own dividends. The general public will not subscribe, for they know the uncertainty of the investment turning out profitable. And notwithstanding the able letters signed "H" in the *Times* some months ago, I cannot advocate the necessarily wasteful system of contractors' lines, or believe in the principle, "Never mind who is the loser so that the public is benefited." Railway extension is not promoted in the long run by wasteful financing and ruinous projects. On the contrary, such lines injure railway extension by making railways a bye-word and depreciating railway property, and they render it impossible to find supporters for sound and beneficial schemes.

The proper parties to pay for country lines are the proprietors and inhabitants of the districts through which they pass. They are benefited even if the line does not pay a dividend. They have every motive for economical construction and management, and can make a line pay where no one else can. But they will not subscribe any large portion of the capital as individuals. Very few will make a poor investment of any magnitude for the public good, though all might be ready to take their part in a general rate. Almost every country but our own has recognized the fact, and legislated on this basis, by empowering the inhabitants of a district which would be benefited to tax themselves for the construction of a railway. I have shown that in France either the department or the commune may vote a subvention out of their public funds, and that in the United States the municipalities vote subsidies of municipal bonds. In Spain the provinces and the municipalities have the power to take shares or debentures, or, if they prefer it, to vote subventions or a guarantee of interest. In Italy the municipalities do the same thing. Why

should not England follow their example, and authorize the inhabitants of parishes and boroughs to rate themselves for a railway which will improve their property, or empower them to raise loans on the security of the rates, to be paid off in a certain number of years by a sinking fund, as is done for sanitary improvements? I see no other way of raising the nucleus of funds for carrying out many rural lines which would be most beneficial to the country.

I can give a remarkable instance of the benefits caused by an unremunerative railway. In 1834 the inhabitants of Whitby projected a line from Whitby along the valley of the Esk to Pickering, half way to York. The line was engineered by George Stephenson, and was originally worked by horse-power and carriages on the model of the four-horse coaches. But though considered at that time one of the wonders of the world, the line was utterly unprofitable, and the Whitby people looked upon it as a bad speculation, much as the shareholders of the London, Chatham, and Dover look on their present property. The railway was ultimately sold to the Northeastern Company; but though the shareholders got no advantage, somebody else did. Farmers and laborers came to market in Whitby, and got coals and other necessaries at reduced rates, while they sold their produce better. Very soon rents began to rise, and I find the total rise since the construction of the railway has been from an average of 15s. per acre up to 22s., or nearly 50 per cent. But far greater consequences resulted. The cliffs at Whitby were known to contain nodules of ironstone, which were picked up and sent to ironworks on the Tyne. Soon after the opening of the railways George Stephenson and a number of Whitby gentlemen formed a company, called the Whitby Stone Company, for working stone quarries and ironstone mines at Grosmont, about six miles up the railway. At first the ironstone was very badly received by the iron founders, and it was only after long and patient perseverance that the company got a sale for what they raised. It was not till 1844 and 1846 that the merits of the Cleveland ironstone were fully acknowledged and large contracts entered into for its working throughout the district. Thus the unprofitable Whitby and Pickering railway opened up the Cleveland iron district and caused the establishment of a very large number of foundries and the employment of thousands of workmen, and has added very materially to the wealth of England.

XIII.—CONCLUSION.

From the facts which have been brought forward I draw the following conclusions :

1. Railways have been a most powerful agent in the progress of commerce, in improving the condition of the working classes, and in developing the agricultural and mineral resources of the country.

2. England has a more complete and efficient system of railways than any other country, but is not so far ahead that she can afford to relax her railway progress, and to let her competitors pass her in the race.

3. England ought to improve the internal organization of her railways, both as to finance and traffic, and to constitute some central authority with power to investigate and regulate.

4. A sinking fund should be instituted to purchase for the State a portion of the railway capital, and so to lighten the charge of the national debt.

5. Power should be given to parishes and boroughs to rate themselves in aid of local railways in order to facilitate the construction of country lines.

6. England, as a manufacturing and commercial country, is benefited by every extension of the railway system in foreign countries, since every new line opens up fresh markets and diminishes the cost of transporting her manufactures.

I cannot conclude without saying a word on the future of railways. The progress of the last thirty-six years has been wonderful, since that period has witnessed the construction of about 85,000 miles of railway. The next thirty-six years are likely to witness a still greater development and the construction of far more than 85,000 miles. We may look forward to England possessing, at no distant date, more than 20,000 miles, France an equal number, and the other nations of the continent increasing their mileage until it will bear the proportion of 1 railway mile to every 10 square miles of area, instead of the very much less satisfactory proportions stated in the comparative table. We may expect the period when the immense continent of North America will boast of 100,000 miles of line, clustered in the thickly-populated Eastern States and spreading plentifully through the Western to the base of the Rocky Mountains and over to California and the Pacific. We may anticipate the time when Russia will bend her energies to consolidating her vast empire by an equally vast railway network. We may predict the day when a continuous railroad will run from Dover to the Bosphorus, from the Bosphorus down the Euphrates, across Persia and Beloochistan to India, and from India to China. We may look for the age when China, with her 350,000,000 of inhabitants, will turn her intelligence and industry to railroad communication.

But who shall estimate the consequences that will follow, the prodigious increase of commerce, the activity of national intercourse, the spread of civilization, and that advance of human intelligence foretold thousands of years ago by the prophet upon the lonely plains of Palestine, "when many shall run to and fro upon the earth, and knowledge shall be increased?"

FOUR HUNDRED AND FORTY MILLION DOLLARS OF SUBSIDY GRANTED BY THE BRITISH GOVERNMENT TO BUILD RAILWAYS INTO THE COTTON DISTRICTS OF INDIA.

The efforts recently made by the English government to develop the resources of its vast empire in Hindostan, evince remarkable energy and sagacity. Probably no country in the world has made more material progress within the last few years than British India. Notwithstanding the discouragements arising from the mutiny of the Sepoys, and the disasters of famine and financial collapse, the present condition and future prospects of the people have been greatly improved. Railroads have been built, highways have been thrown up, canals widened and deepened, obstructions removed from rivers, bridges constructed over rivers and mountain chasms, and the jungle has been rendered passable for the first time.

These great changes in the condition of the interior of British India were initiated, or, at least, actively commenced in accordance with a policy adopted at the commencement of our civil war. England, in place of attempting to break up our monopoly of the cotton trade by an open and formal assistance of the South, resolved to effect the same object by other and surer means. Her statesmen, with far reaching sagacity, resolved to improve the opportunity afforded by the American crisis, so as to attach the tottering Indian Empire to the imperial government by a bridge of gold.

In 1860-61, the Marquis Dalhousie, Governor General, inaugurated the extensive system of internal improvement, which was to enable the people of Hindostan to compete with America for the cotton trade of the world. The most favorable cotton regions of India were inaccessible for want of proper facilities for communication. In order to get the staple to a market, it was necessary to carry it by man and horse power over vast tracts of jungle, across mountains and ravines, and ferry it over great rivers.

To obviate these difficulties, the railroad movement inaugurated was of the most comprehensive character. The population of India subject to the English government is probably not less than two hundred millions. The country comprises an area of 1,364,000 square miles, stretching 1,800 miles in length and 1,500 miles in breadth from east to west. This great country is broken up into an almost endless geographical diversity. There are vast and impassable jungles, huge forests, mighty rivers, mountain chains and extensive plains, the whole being combined with a wonderful luxuriance of vegetation, which at every step obstructs progress and almost prevents any passage by man or beast.

It was over this country, presenting so many difficulties, that Lord Dalhousie contemplated his admirable network of railroads. The system was, of course, planned with reference to the geographical features of the country, so as to connect the extremes of the vast empire with grand trunk lines, from which branch lines, or feeders, might be constructed, according to the future requirements of local commerce. Four thousand six hundred miles of railroad were to be built, at an estimated expense of \$440,000,000. *The credit of the imperial government was granted to private companies, guaranteeing a certain amount of interest on all money invested in Indian railroads.* The government wisely left all details of construction and management to the energies of the companies themselves, which had every motive for economy, as all money earned above the guaranteed dividends was clear gain. The system worked so well, that last year several Indian railways exceeded the 5 per cent. guaranteed interest. During the half year ending December 31st, the East Indian and the Great Peninsular railroad companies were able to declare surplus dividends. Half the amount of surplus income was devoted to the repayment of former advances for interest by the government, and the other half was divided among the stockholders.

The net amount of guaranteed interest paid by the government diminishes every year. In 1865 the amount was £1,450,000; in 1866 it was £800,000, and this year only £600,000 was required. These figures indicate the profitable character of these Indian railroad enterprises.

The original system of Indian railroads contemplated the establishment of communications between Bombay, Madras, and Calcutta, the three

great centres of military and commercial power. The extremes of the empire were united, and roads were cut through the great agricultural and producing districts. The East Indian Railroad Company has now under its management 1,310 miles of railway, constructed at an expense of \$100,000,000, and is the longest line of road in the world under one company. The Great Indian Peninsular road will be 1,233 miles long when completed, and next year it will be open for traffic along its entire length. In 1868, from Calcutta to Bombay, a distance of 1,458 miles, there will be an unbroken railroad communication. The branch lines connecting with the main stems are of great extent, and will cost as much money as the main roads. To show the progress of Indian railroads it may be stated that it is only fourteen years since the first line was opened in that country. At the present time there are 3,200 miles in operation, and next year a thousand additional miles will be completed.

This development of railroads in British India is of the highest importance as affecting the cotton trade. Formerly we enjoyed a monopoly of the market; now, nearly one-half of the cotton manufactured in England is derived from India alone. A late Liverpool circular estimates the quantity of American cotton now on hand and to arrive before December 31st, 1867, at 680,000 bales, while the supply of India cotton for the same period is estimated at 925,000 bales. Without expressing any opinion as to the correctness of these figures, the more important fact for us to remember is that the manufacturers of England have so altered and improved their machinery as to be able to use in much larger proportion than formerly the shorter India staple, while, at the same time, the quality of cotton from that country has been decidedly and steadily improved, and is being more carefully prepared for market. Judging then of the future from the past, it may be expected to equal the American article at no distant period.

The establishment of railroads in India removes the chief obstacles to the growth of an almost unlimited supply of cotton. The country is admirably adapted for it, and the teeming population has long been familiar with the staple, and exhibit great aptitude in its culture. The best cotton regions have not yet been opened to the world; the only facilities for reaching a market being the slow and expensive process of cattle teams. The new railroads, however, will convey the products of these regions to market cheaply and expeditiously. And it is a noticeable feature of Indian railroad companies that their revenues are derived from goods rather than from passengers. Of \$35,000,000 income of Indian railroads during the three years ending June, 1866, two-thirds were received from merchandise traffic.





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