

The railway mania of the 1860s and financial innovation

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Preliminary version, January 11, 2022

Abstract. The 1860s witnessed Britain’s third, and last, large railway mania. Although it added about as much mileage to the rail network as the great Railway Mania of the 1840s, little is known about it in modern literature. This paper documents how this mania managed to delude investors into pouring immense sums into the expansion of a public infrastructure. It did so by stealth, by introducing a variety of “financial innovations” reminiscent of those involved in the Global Financial Crisis of 2008. That period, just like ours, featured new technologies, novel business models, rapid globalization, dramatic increases in speed of information transmission, and proliferation of misinformation and disinformation. Combined with progressive relaxation of government regulation and extremely opaque accounts, the “financial engineering” of the 1860s misled even very knowledgeable and inquisitive observers, such as Walter Bagehot. The results included the Overend, Gurney crash of 1866, ruin to many individuals and businesses, and a large, but inefficient, expansion of the rail network. These in turn likely influenced the legal and institutional foundations of corporate capitalism. There are striking similarities to many aspects of modern financial markets that might be instructive, especially in the widespread reliance on “search for a greater fool” approaches.

Introduction

Britain experienced three great railway manias¹. That of the 1840s is the famous one, which turned out to be an investment disaster, but provided the country with a nationwide communication network of great utility. It was preceded by the mania of the 1830s, which was successful not only in terms of social utility, but in providing above-market returns to investors². And then there was the mania of the 1860, about which there is very little in the literature. Yet in terms of real capital investment, it was about as large as the one of the 1840s (but considerably smaller relative to the size of the economy), and about twice as large as the one of the 1830s. The two railway manias of the 1840s and 1860s involved

¹ For simplicity, Britain in this work will be taken to refer to all of the British Isles, including Ireland. In the 19th century this was all officially UK. However, the vast majority of railway mileage, and even more of railway capital, was in Britain itself. The special aspects of Irish railways are an interesting topic by themselves, but are ignored here.

² A. M. Odlyzko (2010b) “This time is different: An example of a giant, wildly speculative, and successful investment mania,” *B. E. Journal of Economic Analysis & Policy*, vol. 10, issue 1, Article 60. Preprint available at <http://ssrn.com/abstract=1573974>.

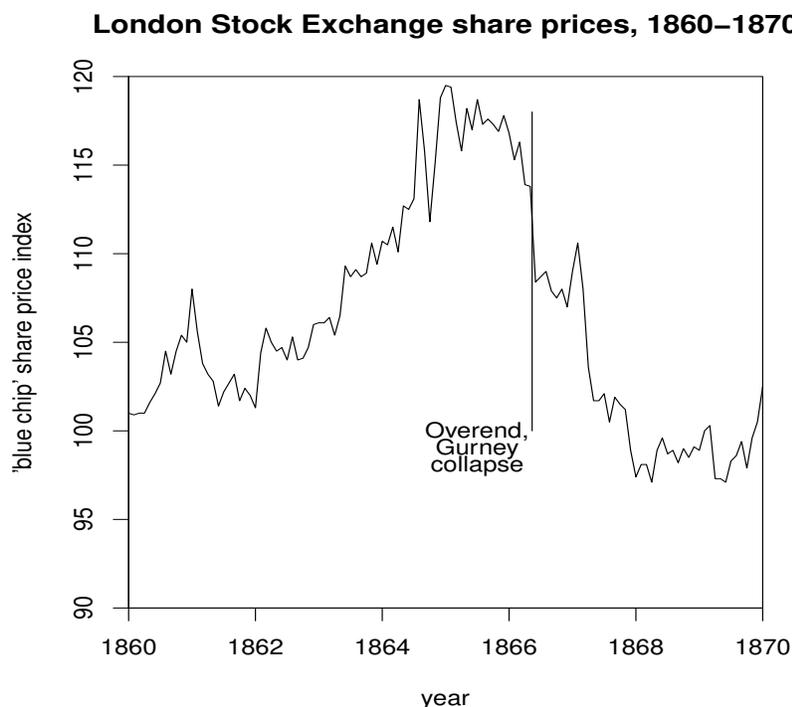


Fig. 1. London Stock Exchange, index of ‘blue-chip’ domestic company share price prices, 1860 to 1870.

capital investments of 15 to 20% of GDP, comparable to £300 to 400 billion for UK or \$3 to 4 trillion for USA today. (These were not stock market valuations, but actual funds provided by investors.)

The railway mania of the 1860s heavily involved so-called “contractors’ lines,” lines whose promotion, financing, and construction were said to be orchestrated by railway contractors. Those have been almost universally reviled in the literature, as they have been blamed for the investment disaster of the 1860s, including the Overend, Gurney crash of 1866. This paper shows that while contractors were important, they were just one of several elements that combined through novel forms of “financial engineering” to inflate the general investment mania of the 1860s. The huge expansion of the railway system was one of the main results.

Modern economic and financial history has disappointingly little about the British investment mania of the 1860s. It usually comes up only incidentally, in connection with the Overend, Gurney financial crash of May 1866. The actions of the government (colloquially called suspension of the gold standard) and of the Bank of England in stemming that panic were described in the most famous parts of Walter Bagehot’s famous book *Lombard Street*³. This work is often called the “Bible of central bankers,” as its prescriptions for what financial authorities should do in a crisis, modeled on what was done in 1866, are

³ W. Bagehot (1873) *Lombard Street: A Description of the Money Market*, London.

frequently invoked as justification for “Lender of Last Resort” actions. However, there were many other interesting developments in finance in that period. They seem worthy of study, especially for anyone interested in understanding how crashes such as that of Overend, Gurney occur, and how they might be prevented or at least mitigated. They also lead to some provocative insights into the rise of modern corporate capitalism.

Fig. 1 shows an index of London Stock Exchange prices during the decade of the 1860s. It is the ‘blue chip’ index from a recent work⁴, and so is dominated overwhelmingly by the large well-established British domestic railways. The variation in prices is not very great when compared to what happened in some of the more famous historic crashes, such as those of the South Sea Bubble or the Internet bubble. However, this chart represents largely shares of large railways, which investors by 1860 had learned to expect to be very stable. So for contemporary Victorians, Fig. 1 depicts a shocking financial catastrophe. What is actually visible in that graphical display are what were then perceived as two shocking financial catastrophe, less than a year apart.

Fig. 1 shows there was a large and rapid decline in share prices that preceded the Overend, Gurney crash of May 1866, and that it continued for a short while afterwards before stabilizing by the end of June. But then there was another large decline, almost as large as that of 1866, in early 1867, and then yet another, smaller one, at the end of 1867. Those later declines do not seem to be covered in modern economic history literature⁵. That is a pity, as the share price declines of both 1866 and 1867 were closely related and were the outcomes of the same complicated financial processes. Neither can be fully understood without taking into account the other.

The financial crash of 1866 led the British government to suspend the gold standard. It was primarily a crisis of the financial sector. The railway share crash of a year later occurred when investors realized the 1866 crisis had not cleared away all the accumulated detritus, that many of the major railways had been building up a lot of rot inside. That later crisis was resolved by the market, as this time government refused to get involved, in spite of appeals for intervention from prominent industry leaders.

“History does not repeat, but it rhymes,” is a famous saying that applies well to financial crises. The Overend, Gurney crash of 1866 and the railway share crashes of 1867 have many features in common with the Global Financial Crisis of 2008, and possibly with the global markets of late 2021, as this paper is being written. Some are mentioned later here, and others are discussed in another paper⁶. Probably the most noteworthy general common feature is the extensive reliance on a combination of “financial innovation” with opaque accounting in an environment of greatly increased complexity. The British crises of 1866 and 1867 may be the very first large case where novel financial instruments and intentional obfuscation by many market actors led to the financial debacles in ways that were not fully understood even by knowledgeable market players. In addition, there was, again possibly

⁴ G. Campbell, R. S. Grossman, and J. D. Turner (2019) “Before the cult of equity: New monthly indices of the British share market, 1829-1929,” preprint, available at http://repec.wesleyan.edu/pdf/rgrossman/2019003_grossman.pdf.

⁵ For example, B. C. Hunt (1936) *The Development of the Business Corporation in England, 1800–1867*, Cambridge, Massachusetts, does not mention them at all, and this is typical.

⁶ A. M. Odlyzko (2019b) “Bagehot’s giant bubble failure,” preprint available at <https://ssrn.com/abstract=3445450>.

for the first time in history on a large scale, widespread reliance on “searching for a greater fool” approaches. Those are often claimed to have been central to the financial scene in the mid-2000s. In that episode, derivatives, lauded as distributing risk to those most able to bear it, were instead used to lodge risk with those who understood risk the least. Similar phenomena, discussed later, were also key to what happened in the 1860s. In another close similarity with the Global Financial Crisis (GFC), none of the players in the 1860s set out to destroy the financial system, but they worked in ways that undermined its stability. In both cases, there were astute observers who worried about what they saw, but it appears that in the 1860s none realized just how unstable the markets were and how large the imbalances in the financial system were.

Aside from amusing analogies (although ones that, had they been known and acted upon, might have helped prepared financial system decision makers for the GFC), there are also deeper lessons. The events of the 1860s provide a large-scale example to support Keynes’ critique of neoclassical economics, with its foundational equilibrium assumptions. For example, to present a simplified version of his theory, Keynes argued that the economy has inherent instability because “the level of output and employment as a whole depends on the amount of investment,” and that one is hard to predict, since it is “influenced by our views of the future about which we know so little”⁷. He could have made his argument much stronger by citing the example of the mania of the 1860s, where huge investments were induced by “beautiful illusions” about likely profits that had no substance.

The railway mania of the 1860s raises doubts about many of the standard long-cycle and general technology diffusion models. Those doubts are similar to the ones that were shown to be associated with the railway mania of the 1830s⁸. The three giant spasmodic construction episodes that took place in the space of three decades are simply not reflected in existing literature.

Some more speculative conclusions can also be drawn about the foundations of modern corporate capitalism. These are mentioned briefly in one of the last sections of this work, on “Results of the mania of the 1860s.”

There are also some additional more concrete lessons that can be drawn from the British experience of the 1860s. Questions have been raised as to whether central banks can deflate bubbles by raising interest rates. The 1860s appear to provide an unambiguous example where this did not suffice. Short-term rates did rise during several periods to what were regarded as exorbitant levels that were damaging to the ordinary economy⁹. (However, this was due only partly to the actions of the Bank of England, the nearest to a central bank that Britain had, as it then had limited influence on interest rates.) Yet the mania kept inflating. What happened can be described succinctly by a memorable passage by Karl Marx, who lived in London through that whole decade. He wrote¹⁰:

⁷ J. M. Keynes (1937) “The general theory of employment,” *Quarterly Journal of Economics*, vol. 51, no. 2, February 1937, pp. 209–223.

⁸ Odlyzko, *op. cit.* (note 2).

⁹ See the chart of the Bank of England rate of discount in Odlyzko (2019b), *op. cit.* (note 6).

¹⁰ K. Marx, *Capital*, vol. 3, Chapter 33, F. Engels, ed., first published posthumously in 1894, English translation by T. Delaney and M. Griffin of 1999 available at (<https://www.marxists.org/archive/marx/works/1894-c3/ch33.htm>). It is not known when Marx wrote that passage. The phrase omitted from the quote refers to 1857, since Marx was commenting on a discussion about causes of high interest rates that arose in a Parliamen-

a high rate of interest can also indicate, ..., that the country is undermined by the roving cavaliers of credit who can afford to pay a high interest because they pay it out of other people's pockets (whereby, however, they help to determine the rate of interest for all), and meanwhile they live in grand style on anticipated profits. Simultaneously, precisely this can incidentally provide a very profitable business for manufacturers and others.

In the 1860s “the roving cavaliers of credit” did “provide a very profitable business for manufacturers and others” (at least for a while, as when the crash came, many were themselves pulled into the vortex of destruction). Marx's words about “other people's pockets,” and “liv[ing] in grand style on anticipated profits” capture well the essence of what many of the influential financial actors were doing. They were indulging in combinations of outright fraud, artful manipulation of accounts, wishful thinking, willful closing of one's eyes, and cynical creation of “beautiful illusions” in order to find and snare a “greater fool.”

The focus of this paper is on the relaxation of government regulation, the opacity of accounts, and the financial innovation that enabled those “roving cavaliers of credit” to interact with a variety of actors, the builders of the infamous “contractors' lines” the most prominent among them, to accomplish a huge expansion of the British rail network. What is perhaps most surprising is they did it surreptitiously. There were many astute observers of the financial markets and of railways, and many of them saw at least some of the potential dangers, but it was only after the railway share crash of 1867 that the full extent and complexity of what had happened became apparent. It was only then that the key role of railways in enabling the activities of “the roving cavaliers of credit” was realized, as well as the damage that railway investors suffered from those activities.

What is still lacking in the literature are reliable and precise quantitative measures of what happened in the British economy, and especially in its financial aspects, in the 1860s. To obtain such will require much further research, and one motivation for this work is to stimulate such investigations by showing they might have interesting implications not just for economic history, but for current evolution of financial systems. Accounts of most key institutions from that period, especially the finance houses and railway contractors, are rare. A careful examination of records of individual railways might provide insightful data that is simply no longer available from any other sources about the financial flows of the 1860s. Railway history could thereby provide valuable new insights into an important phase in the evolution of modern corporate capitalism.

The extent and effects of the railway mania of the 1860s on the British rail network are discussed in more detail later in the paper. A quick quantitative view can be obtained by looking at Fig. 2 and Table 2. They show that in 1860, the network had about 10,000 miles, and by 1870 that had been extended (largely by financing activities of 1862 through 1866) to about 15,000 miles. Eventually, around 1914, that network reached its peak extent

tary committee hearing in 1857. However, it is very likely this passage was written later, and if so, it probably reflected the benefits of knowledge of what happened in the 1860s.

of about 20,000 miles. Thus about half of the expansion of railway mileage between 1860 and the peak in 1914 was accomplished in a few years in the 1860s¹¹.

By 1860, the beginning of the period considered here, the British economy was growing vigorously, and the important role of railways in enabling that growth was widely accepted. There was increasing demand for more lines, to prevent localities from being left behind and allow them to develop further. (There are obvious similarities to broadband today, but the funding needs were vastly greater then,) A very rough summary of the situation in Britain at that time is that:

Everybody wanted railways.

Nobody wanted to invest in railways.

More precisely, essentially nobody wanted to invest in ordinary (common) shares of railways. The great Railway Mania of the 1840s was such an investment debacle that it resulted in average dividends on ordinary shares being just 1.83% in 1850, whereas investors had dreamed of 10% payouts, and were inveigled into risking their money by promoters' promises this 10% level would be attained or exceeded. This only grew to 3.06% in 1858¹². This was at a time when the risk-free return on Consols (the basic British long-term government bond) varied roughly in the 3 to 3.5% range¹³. On the other hand, because of government restrictions on railway finance, and high and growing demand for railway services, railway bonds and preference shares were doing very well¹⁴. On average, they paid 5% in 1850, and still 4.63% in 1858, and they did so with essentially no defaults. So, not unnaturally, British investors came to regard railway common shares with great suspicion, but were willing to invest in bonds and preference shares. Table 1 provides a summary view of the capital structure of railway industry. It is based on official government statistics¹⁵ and so, as will be discussed later, figures in it are distorted by omission of some of the financing that was produced by "financial engineering" that is detailed in this paper. For comparison, British GDP was around £900 million during the mid-1860s.

A government commission of 1866–67 reported¹⁶:

¹¹ However, as will be mentioned later, capital investments after 1870 grew far faster than mileage.

¹² United Kingdom (1859) *Report of Proceedings of Railway Dept., 1858*, Parliamentary Papers 1859 Session 2 [2560] XXVII.637.

¹³ It should be noted that rates of return apparently did improve somewhat after 1858, and in fact had reached 3.6% in 1857. The series of comprehensive reports from which the data cited above was drawn one stopped providing profit data for some years after 1858: United Kingdom (1859) *Report of Proceedings of Railway Dept., 1858*, Parliamentary Papers 1859 Session 2 [2560] XXVII.637.

¹⁴ American railroads had much less equity, and more debt financing, so their securities were far more volatile, and several times in the 19th century large parts of that industry went through bankruptcy. In Britain, railway bankruptcy was essentially unheard of until after the crisis of 1866, and was rare after recovery from it.

¹⁵ United Kingdom (1859) *Report of Proceedings of Railway Dept., 1858*, Parliamentary Papers 1859 Session 2 [2560] XXVII.637; United Kingdom (1876) *Railway Returns for England and Wales, Scotland and Ireland, 1875*, Parliamentary Papers 1876 [C.1540] LXV.117.

¹⁶ United Kingdom (1868) *Railways (Ireland) Commission. Report of the commissioners appointed to inspect the accounts and examine the works of railways in Ireland, ...*, Parliamentary Papers 1867-68 [4018] [4018-I] XXXII.469, 649. The appendix to that report contains many tales of waste and abuse. Many more can be found in contemporary papers and court documents from the lawsuits that followed. This reports deal only with Irish lines, but its general observations apply to all of UK.

It will be admitted that few, if any, of the later enterprises have been launched on a sound basis of capital *bona fide* subscribed; but the necessity for extensions and additional railways has been so strongly felt that the most strenuous local efforts have been made, and every conceivable financial expedient submitted to, in order to accomplish the much desired result.

The problem for all those interested in railway expansion was how to reconcile the preference among investors for bonds and preference shares, and the restrictions on leverage, with the need for capital. That is where railway contractors, lawyers, and “the roving cavaliers of credit” came in. They employed “every conceivable financial expedient,” which required legal and financial innovation to “square the circle,” hide the rapidly growing leverage from investors, and provide the necessary financing for railway expansion. They did it by altering the capital structure of the industry in a covert way. Reality was bound to catch up with them eventually, but, as is often the case in finance, it was successfully concealed for quite a while.

The growing fraction of debt and preference shares in railway capital is illustrated in Table 1. Parliament’s initial intention was that public infrastructure projects such as canals or railways were to be financed completely by ordinary shares. But even long before the 1830s, this was relaxed by allowing up to 25% of capital to be in loans. Still, equity was to be at least 75% of the total, and preference shares were rare, so ordinary shares is what was expected. Yet by 1875, ordinary shares were down to 40% of capital¹⁷. Allowing increased leverage went along with relaxation of other rules, either by explicit decisions by Parliament, or by creative financiers and creative lawyers finding ways to get around existing rules, and often by blatantly ignoring such rules. This transformation of the capital structure of British railways went on gradually, and in a stealthy manner, so that investors were not aware they were putting their money into investments much riskier than what they thought.

Table 1. Capitalization of British railways.

| year | common shares £ millions | preference shares £ millions | debenture bonds £ millions | debenture stock £ millions |
|------|--------------------------------|------------------------------------|----------------------------------|----------------------------------|
| 1850 | 150.0 | 34.7 | 55.5 | - |
| 1855 | 169.6 | 52.8 | 75.2 | - |
| 1860 | 190.8 | 67.9 | 81.9 | 7.6 |
| 1865 | 219.6 | 124.3 | 97.8 | 13.8 |
| 1870 | 229.3 | 158.7 | 90.7 | 51.2 |
| 1875 | 254.6 | 222.3 | 40.4 | 123.0 |

It needs to be emphasized that Parliamentary restrictions that made railway loan and preference share capital a very safe investment before the 1860s were not enacted primarily

¹⁷ However, ordinary and preference shares did make up approximately the 75% that was expected. So the main shift, at least in the official statistics, was from ordinary to preference capital.

to protect investors. (And investors in ordinary shares did suffer losses that attracted only a few words of sympathy in Parliamentary debates.) As is described in more detail later, what Parliament was determined to achieve was that each railway that was authorized was going to be built and would continue to operate in ways that provided real service to the public. That was felt to be the only way to justify the gross violation of the “sacred right of property” that Parliament was engaging in by giving railways the right of compulsory acquisition of land. There were numerous critics, with Colonel Sibthorp in the House of Commons and Lord Brougham in the House of Lords as the most prominent in the 1840s, who railed at private companies being allowed to do what even the monarch could not, namely force people out of their homes for the benefit of those private companies, which were maligned as “monopolies.” Only an assurance that an important public benefit was going to be obtained could assuage such concerns. But the way Parliament went about convincing itself and the public of those benefits did result in railway loan and preference investors having very secure holdings, at least until “the roving cavaliers of credit” went to work.

The Glenmutchkin Railway satire was written at the height of the Railway Mania of the 1840s in order to warn the public of the silliness and danger of that craze¹⁸. While it was a satire, it was an outstanding parody of railway promotions in the mid-1840s, and while it had some implausible elements, in other parts it did not reach the height of absurdity of some actual projects. However, while the author, William Edmonstoune Aytoun, was a lawyer who was a railway investor and practised railway law before Parliamentary committees, he elided most of the technical details involved in promoting new lines in order to concentrate on the colorful and memorable atmosphere of the time. Still, there are a few incidental mentions of those details in his story, for example in the discussion of a “provisional committee” where the two protagonists, Augustus Reginald Dunshunner and Bob M’Corkindale, worry about the need for “some respectable names,” and dream of “producing a peer to begin with.” In practice, even the most ridiculous or fraudulent projects of the 1840s that got as far as an application to Parliament involved substantial public scrutiny, with recruitment and wide publicity of those “provisional committees,” with publication of prospectuses with detailed business plans, solicitations of investors, deposits of substantial sums with a government agency, examination of all aspects of the proposals by Parliament, and then regular meetings of shareholders, calls for money, and the like. (Some details on this process will be presented later.) Hence, aside from a few cases of extreme fraud, railway projects that were sanctioned by Parliament and went into construction had financial structures that were dominated by a large common equity component, and the volume and composition of the funding were reported pretty reliably in the press, so were visible to investors. Hence purchasers of bonds or preference shares of these companies could not hope for exorbitant profits, but could be sure their investments were protected by a large safety cushion.

By the 1860s, relaxation of Parliamentary regulation and ingenuity of legal and financial agents transformed railway enterprise. Gone was the extensive publicity. In its place were

¹⁸ W. E. Aytoun (1845) “How we got up the Glenmutchkin Railway, and how we got out of it,” *Blackwood’s Edinburgh Magazine*, vol. 58, no. 360, Oct. 1845, pp. 453–466. Available online at <http://www.dtc.umn.edu/~odlyzko/rrsources/index.html> and many other websites.

small groups working in intentional obscurity (sometimes one group taking on the task of getting Parliamentary sanction, and then selling the project to another one that went on to raise funds and start construction), which put in little or no common equity, but manufactured the illusion that they had, so as to sell bonds and preference shares, and to some extent even common shares. The Overend, Gurney crash of 1866 was precipitated largely when these illusions were shattered. A string of bankruptcies preceding that crisis of early May 1866 slowly revealed what had been happening. In the week preceding that crash, a railway paper wrote that a financial mystery was finally being solved. For some time, it noted, “people wondered” how so many projects had been going on without publicity, “silently, noiselessly, triumphantly—as if the parties had become possessed of some mine of wealth, and feared to have too much said about it. ... The magic turns out to be “Finance.””¹⁹. It was indeed the work of “the roving cavaliers of credit,” and it produced railways with no common equity cushion, and often little prospect of being able to pay the holders of bonds and preference shares.

In the mid-2000s, there were many observers who saw some of the questionable practices, such as the “no-documentation loans,” and warned about dangers posed by “financial innovation” (as in Warren Buffett’s characterization of derivatives as “financial weapons of mass destruction”). Similarly, in the 1860s there were many observers who were aware of the legal and financial innovations that were transforming the markets and leading to an unstable system. However, none of them appear to have understood how complicated the system was, and how dangerous.

Many of the themes that are prominent in this work, such as contractors’ lines, finance houses, Lloyd’s bonds, and poor accounting, have already been treated, or at least touched upon, in a variety of other publications²⁰. What this work does is bring these themes together, puts them into perspective as key elements of the investment mania of the 1860s, and explains in much greater detail just how legal and financial innovation enabled the fleecing of large segments of the investing population in order to build out the railway network.

The next few sections outline the investment mania of the 1860s, the role of railways in it, “contractors’ lines” and their role in the expansion of the industry, and the issue of “tampering and jobbery,” meaning various forms of what many called corruption, and others a “new morality.” Then follow the main sections on how “creative finance” was

¹⁹ *Herapath’s Railway Journal*, 5 May 1866, p. 538. This was not the first indication of a growing awareness of what had been happening. Bagehot wrote about this in the leader “The new finance and discount companies” in *Economist*, 24 February 1866, pp. 221–22, and so did others. And some observers had warned this was likely to happen years earlier.

²⁰ P. L. Cottrell (1975) “Railway finance and the crisis of 1866: Contractors’ bills of exchange, and the finance companies,” *Journal of Transport History*, vol. 3 (NS), no. 1, Feb. 1975, pp. 20–40; P. Cross-Rudkin (2016) “Contractors’ lines – a system of tampering and jobbery?,” pp. 130–147 in P. Cross-Rudkin, ed., *Early Main Line Railways: Papers from the International Main Line Railways Conference*, Clare; Hunt, *op. cit.* (note 5); L. H. Jenks (1927) *The Migration Of British Capital To 1875*, New York; H. Pollins (1957a) “Railway contractors and the finance of railway development in Britain–I,” *Journal of Transport History*, vol. 3, no. 1, May 1957, pp. 41–51; H. Pollins (1957b) “Railway contractors and the finance of railway development in Britain–II,” *Journal of Transport History*, vol. 3, no. 2, Nov. 1957, pp. 103–110; H. Pollins (1957c) “Railway auditing—A report of 1867,” *Accounting Research*, vol. 8, no. 1, Jan. 1957, pp. 14–22; L. Popplewell (1988) *Contractors’ Lines*, Southbourne.

combined with “creative law” to transform the nature of railway capitalizations so as to evade Parliamentary restrictions. Those sections are followed by some concrete and colorful examples of how such moves operated to mislead investors, as well as impartial observers. At the end comes a section which summarizes the results of the railway mania of the 1860s and outlines missed opportunities for Britain in terms of obtaining a better railway system. Finally, there is a conclusion section.

The general investment mania of the 1860s

The investment mania of the 1860s started in the middle of what has been called the “Great Victorian Boom,” which is usually dated from 1850 to 1873. It was a period of unprecedented economic growth. Contemporaries usually attributed this to some combination of three factors that were felt to have started to operate on a large scale around 1850, namely railways, free trade, and gold influx (from newly discovered California and Australia deposits). This period altered not only the economy, but popular views on the future. While economic and technological development had been known and embraced by most people before that, those were thought to occur sporadically, and be interspersed, even in the absence of major wars, with calamitous financial crashes and disasters such as the Great Irish Famine of the late 1840s. Starting in mid-century, this changed, and Britain experienced a period of very rapid (for those days) and relatively steady growth, which changed expectations. There was a lack of general economic statistics that we now take for granted. However, foreign trade happened to be closely monitored, and it was visibly booming, and was often cited as a reflection of general growth of prosperity. Britain’s leadership in the world in terms of technology, industrial production, and financial and military might were at about their peak. It would only be in the last quarter of the 19th century that America and Germany began to catch up and surpass it.

Globalization was proceeding rapidly. It was facilitated by improved transportation and communication. Railways were by far the largest industry of the 19th century in terms of capital investment, and they did revolutionize land travel and transport of goods. Steamships similarly speeded up sea transport and made it more reliable. After several failed attempts, the Atlantic was finally crossed by a reliable telegraph cable in 1866. But already by 1860, before the start of the mania, the electric telegraph had tied together all the major European cities, and was accelerating economic and financial integration.

Britain did face threats, or potential threats. They involved the possibility of getting drawn into the American Civil War, as well as various Continental European entanglements. Economically, the American upheaval with the Northern blockade of Confederate ports that started in 1861 led to the interruption of crucial raw materials supplies for the very important textile industry, the “cotton famine.” That produced a major shock that idled many factories, and required a scramble for new sources of cotton.

As with most bubbles, the British one of the 1860s was facilitated by low interest rates, the result of high savings arising from the growing prosperity. Walter Bagehot, one of the most famous and most influential observers of that period, often cited the aphorism that “John Bull can stand a good deal, but he cannot stand two per cent.” This reflected a very widely held fear that low interest rates would drive British investors into wasting their

savings by putting them into foolish or fraudulent projects. (Zero or negative interest rates would surely have appalled them, although a few special cases of such financial anomalies had occurred by that time.) Periodic crises, driven by investors' crowd psychology, were regarded as inevitable.

Plentiful savings resulting from the vigorous growth of the economy and the accompanying low interest rates were a key ingredient for the mania of the 1860s²¹. But there were several others, in particular the easing of the rules on creation of limited liability companies, the demand for railway expansion, opaque accounting, and "financial innovation" that tied all these together.

Joint-stock companies were treated with great suspicion in Britain for a long time. The Bubble Act of 1720 (passed during the South Sea Bubble) made it very difficult to create such an enterprise, as an Act of Parliament or a Royal Charter were required. In the early stages of the 1825 investment mania, the Bubble Act was repealed, so it became relatively easy to set up new companies. However, all shareholders had unlimited liability, unless special permission (seldom granted) was obtained from the government. Routine availability of limited liability for companies was only attained in the mid-1850s, but the legislation of that period still had some restrictions, and setting up a company was cumbersome. Finally, in 1862, Parliament passed "The Companies Act, 1862," 25 & 26 Vic. c. 89, which loosened the restrictions further. This act remained the basic framework for corporate law in Britain for the next half a century, and much is made of it in the Gilbert and Sullivan operetta *Utopia, Limited*. Combined with ebullient investor sentiments, "The Companies Act, 1862," led to an explosion in the number and capitalization of new enterprises being formed, from that point on overwhelmingly on the "limited principle," as it was called²².

One compilation of official data (whose misleading nature will be discussed later) shows that 1860 witnessed the registration of 409 joint stock companies with total nominal capital of £17 million. In 1864 that number reached 975 companies with nominal capitalization of £235 million (with those numbers then dropping precipitously to 448 and £33 million in 1868)²³. So while the number of companies increased by almost 150% from 1860 to 1864, their capitalization grew by almost 1,300%. What happened is that after the the passing of The Companies Act, 1862, the rate of creation of small companies, which dominated before, about doubled, but in addition they were joined by a smaller number of firms with very large capitalization, primarily in finance.

²¹ There were some periods of high short-term interest rates during the mania, but this did not include all short-term rates, which helped confuse the picture for observers such as Bagehot. This is discussed in Odlyzko (2019b), *op. cit.* (note 6). But there were also many periods of low rates, and long-term rates, such as those on Consols, remained moderate.

²² For some more details and references, see Hunt, *op. cit.* (note 5), Jenks, *op. cit.* (note 20), and Odlyzko (2019b), *op. cit.* (note 6). However, H. A. Shannon (1932) "The first five thousand limited companies and their duration," *Economic History* (supplement to *The Economic Journal*), vol. 2, Jan. 1932, pp. 396–424, has argued persuasively that The Companies Act, 1862, was not as significant as most of the literature claims, since previous joint stock company legislation was already very permissive. Further, this act was not regarded as significant in 1862 as not much attention was paid to the debates about it or to its enactment in contemporary press. However, its enactment coincided neatly with the explosion of company formations. Whether that was a coincidence, as Shannon's thesis implies, or whether there was a close causal connection is an issue worth deeper investigation.

²³ Jenks, *op. cit.* (note 20), p. 238.

Many, and perhaps most, of the small companies were private concerns, often in manufacturing, or small-scale trade and related concerns, going public. Owners saw the high valuation that joint stock companies were commanding in the stock market, so decided to cash in. They were assisted in getting very good deals by a type of “financial innovation” that was novel for Great Britain, although it was apparently already quite common in Continental Europe. Prospective investors were enticed with rosy promises in prospectuses, and were lured into signing the articles of association, which governed how their company was to be run, without careful examination. Those articles were often made hard to obtain, and sometimes had provisions outright contrary to the prospectus. Moreover, they often had unexpected provisions giving the sellers special deals and sometimes special controls. Later, these were often subjects of bitter complaints, especially when, as often happened, those companies came on hard times²⁴. These “financial innovations” were primitive by the standards of modern finance, which features multiple classes of shares, the structure of SPACs with special roles for promoters, hidden fees by private equity, and so on, but they were novel on the British financial scene of the time and they did enrich the sellers and the financial agents they employed.

The fate of the small companies did not affect the railway industry much, although there was some interaction, with various equipment suppliers to railways in that category. Much more important were the new companies with large capitalizations, especially the so-called finance companies and banks. Aside from ignorance, fraud, and gross mismanagement, they inflicted painful damage on their investors through another “financial innovation.” This was the essentially universal custom among those firms to have partially paid shares. A company would issue shares with nominal value of £50, but would ask investors to only pay £10 on each, with assurance that the business was going to be so successful that no more would need to be called up. On the other hand, that company’s creditors would be assured that this concern was very creditworthy, since even if it had only collected £200 thousand from its shareholders for the 20,000 shares that had been sold, it could in cases of need call on them for another £800 thousand. As it turned out, all too many of those concerns did run into cases of need and had to call (or else have their liquidators call) on shareholders to pay up. So sometimes investors who had purchased shares in the market for £20 that had only £10 out of the nominal £50 paid, were then asked to provide additional £40, and so would have lost in all £60 on what they thought was going to be a £20 stake²⁵. Thus this “financial innovation” enabled promoters to tell investors they had limited liability, whereas in effect their liability was almost unlimited. It should be noted that while some prominent voices, including Bagehot²⁶ did praise partially paid shares,

²⁴ See the “Trade and finance” columns in *Daily News*, 11 July, 25 July, 22 August, and 5 September of 1864, and 24 July 1865, for example. In general, there was extensive debate as to whether the consistency of prospectuses and articles of association should be enforced, and if so, whether that should be by law, by regulations of the London Stock Exchange, or by courts adjudicating cases brought against directors and promoters.

²⁵ Some details of how this scenario played out in the case of the Overend, Gurney concern are presented in Odlyzko (2019b), *op. cit.* (note 6).

²⁶ Cf. Odlyzko (2019b), *op. cit.* (note 6).

there were others that warned about their pitfalls²⁷. But it took the disaster of the crashes of 1866–67 to teach investors that bitter lesson. Investor advice books in later years carried strong warnings against purchasing any shares that were not fully or at least almost fully paid up.

The new financial enterprises that arose in the early 1860s were only a few dozen out of the several thousand joint stock companies of that period, but they amounted to a lion's share of the capitalization, by some measures around 30%. There were several reasons for their prominence. Promoters were eager to “hav[e] a pluck at the public pigeon,” to quote the great Glenmutchkin Railway story²⁸. By the 1860s “it appeared [even more] perfectly certain that all the populous towns would be united, and the rich agricultural districts intersected, by the magical bands of iron” than it had appeared in the Glenmutchkin days, to use Aytoun's colorful language. However, by that time promoters could not concoct plausible stories of how new railways could produce big profits. All the experience of the previous two decades went to show that railway prospects were limited (although that did not stop investors from having modest but still unrealistic dreams, as will be discussed at the end). On the other hand, finance offered examples of what were, or at least seemed to be, extremely profitable ventures. The established British joint stock banks, which had been regarded with extreme suspicion for a long time, were in many cases paying out dividends of 20% per year. (Those were largely real, and Bagehot was among the contemporary observers who explained how such high profits could arise, but only to a limited extent and only in some areas of finance²⁹.) And there was the example of the *Crédit Mobilier* of France, established in 1852, which was declaring superb profits year after year, out of activities that were supposedly those of something like modern investment banking combined with long-term industrial financing. The *Crédit Mobilier* itself imploded in 1867, but in the meantime, in the late 1850s and early 1860s, its model had been copied by other institutions in France and elsewhere in Continental Europe. Promoters discerned here an opportunity, in that they could entice investors with the promise of exploiting a niche in the British financial market that they claimed had been neglected. These new financial institutions, and to some extent older ones, such as Overend, Gurney, which moved into similar activities, helped funnel much of the money for the railway mania of the 1860s.

Inquisitive experts and opaque markets

The French *Crédit Mobilier* invigorated economies around the world by mobilizing capital for many large infrastructure project, and by stimulating creation of similar companies that carried out such activities in imitation. It was very controversial from the start. Con-

²⁷ One such warning appeared in the “Money market” column of *The Times*, 17 October 1864, p. 5. Another was in the article “Railway stocks as investments” in *Railway News*, 31 March 1866, pp. 348–49, which touted the advantage of railway stocks as being largely free of such dangers.

²⁸ Aytoun, *op. cit.* (note 18).

²⁹ A very clear exposition of his views is in *Economist*, 16 Jan. 1869, pp. 57–59. This was several years after the collapse of the mania. However, he presented similar arguments even earlier, at the start of the mania. Others pointed this out, too. For example, the “Trade and finance” column in *Daily News*, 14 April 1862, mentioned that “it is a peculiarity of banking business that, if you can but inspire the public with confidence, they will themselves come forward and supply you with the commodity in which you deal—namely, money.”

siderable attention was paid to it in Britain, and there were many calls for creating similar domestic institutions. But there were also early warnings. Some, such as those of Bagehot, Newmarch, and Walsh, were backed by careful analyses of the scanty available financial information³⁰. Bagehot wrote in 1857 that he would not go as far as another critic, and “call the *Crédit Mobilier* the greatest gambling-house which the world has ever seen; but we must regard it as a formidable speculator, a stock-exchange “operator” of the first magnitude.” Some predicted a quick demise for this venture. However, with official help, extensive obfuscation, and opaque accounting, it avoided a collapse until 1867 (and then continued on for quite a while in a reorganized form), and was cited as a model to emulate.

Very roughly speaking, the French *Crédit Mobilier* and its British imitators started out with surprisingly high profits. Those came largely out of floating new companies, where these finance houses would not just collect fees from their corporate clients, but would also take a large fraction of the shares at the nominal value, and resell in the market at a profit. This, of course, only worked if the market price went above par, but that happened naturally in rising markets, and was also often assisted by market manipulation. When the market did not cooperate, and shares could not be sold at a profit, they were often kept on the books at the acquisition cost, hiding the loss. Still, that type of activity could only be carried to some extent, and so these finance houses after the initial ebullient period were driven into other types of transactions, which frequently involved them in long-term commitments whose losses could be hidden for quite a while, by assigning nice valuations to illiquid stakes³¹. When the French *Crédit Mobilier* collapsed, Bagehot wrote that the public finally learned what shares it held, “and greater rubbish could not have been collected.” In his opinion the British “finance companies have not been successful” but the shares held by the *Crédit Mobilier* “seem even worse than theirs”³².

Two of the early critics of the *Crédit Mobilier*, Bagehot and Newmarch are especially notable, and will be cited very frequently. Bagehot was the most famous editor of the *Economist*, and the most influential. He was very concerned about the dangers of the investment mania of the 1860s, and understood many of the destabilizing factors that were at work. However, he managed to convince himself that the market anomalies he saw were innocuous, the results of a changing economy that was producing great opportunities for new ventures with high profits, and did not reflect an imminent catastrophe. It was only shortly before the Overend, Gurney crash of May 1866 that he became more alarmed. Even after that crash, he did not attain a full understanding of what had happened until after the railway securities crash of 1867³³. What is especially noteworthy is that Bagehot

³⁰ R. H. Walsh (1856) “Notes on the Société Générale de Credit Mobilier,” *Journal of the Dublin Statistical Society*, vol. 1, July, pp. 350–358; W. Bagehot (1857) “The *Crédit Mobilier* and banking companies in France,” *National Review*, vol. 4, January, pp. 152–180; W. Newmarch (1858) “On the recent history of the *Crédit Mobilier*,” *Journal of the Statistical Society of London*, vol. 21, December, pp. 444–453.

³¹ The leader “Financed lines” in *Railway Times*, 18 September 1875, pp. 904–905 presents some examples of the “half-dormant finance associations” that were still limping along after their meteoric rise and later collapse in the mania of the 1860s, and were stuck with investments in railways from that period that were not paying any dividends.

³² *Economist*, 12 October 1867, pp. 1154–54, leader on “The money market here and in France.”

³³ One could argue that he never did gain a complete understanding, since his *Lombard Street* does not pay much attention to the torrents of money going into railway construction, which at a fundamental level enabled the developments that led to the crisis of 1866.

was not just a journalist and an economist. He was also a practical banker. He came from a banking family, and continued working as a banker till the end of his life, as director of the (very successful) provincial joint stock bank his family ran, and was in charge of its small London branch. An account of the market anomalies that bothered Bagehot (as well as other contemporary observers) and how he rationalized them away is presented in another paper³⁴.

William Newmarch was the most eminent economic statistician of the 1860s. A prolific writer, he contributed to many publications, including the *Economist*. At that weekly, he started its series of annual supplements summarizing economic and financial events of the previous year, with extensive commentary and statistics, typically running around 50 closely packed pages. They usually appeared in the middle of March, with the first one, “Commercial History and Review of 1863,” in 1864³⁵. Since everything in the *Economist* was published anonymously then, as it is now, it hard to be certain of authorship, but here it will generally be assumed that the leaders were written by Bagehot, while the annual reviews were penned by Newmarch³⁶.

Newmarch was on the opposite side from Bagehot in the great Currency vs. Banking theory debates about monetary policy. But they were both active bankers, involved in established banks that were very profitable and had survived a number of financial crises. This meant, of course, that their skepticism about new entrants in the financial markets could be, and was, dismissed as that of the “Old Guard” trying to defend their monopoly profits, and prevent the democratizing effect and the lowering of costs via “financial innovation.” (Echoes of such arguments have recurred many times since.)

Newmarch had run an insurance company through the 1850s, and was a director of several companies, in particular the gigantic Grand Trunk of Canada railway (which, it must not be left unsaid, contributed much to the economic development of Canada, but was a gigantic disaster for its investors). In 1862 he was hired as general manager of the private Glyn, Mills bank. This was one of the largest banks in London, and was known as “the railway bank,” as it was the only prominent bank to embrace the new industry in the 1830s. It was still reputed to have more railway banking business in 1860s than any other institution. One of this bank’s key partners, George Carr Glyn, was the most respected, and one of the most influential, of railway figures over the preceding three decades³⁷. Glyn was also an influential MP, and towards the end of his life was created Baron Wolverton. Thus Newmarch was about as knowledgeable and as well connected in the London financial world as one could be. Like Bagehot, he was skeptical of much of the “financial innovation” he observed (although the Glyn, Mills bank he ran served many of the new and doomed institutions, and he was a director of some new ventures), and concerned about its effects on the economy. However, just like Bagehot, by early 1866 he convinced himself there was no danger of a crisis. The “Commercial History and Review of 1865” was published almost exactly two months before the Overend, Gurney crash. In it, Newmarch noted, apparently

³⁴ Odlyzko, (2019b) *op. cit.* (note 6).

³⁵ The dates of publication of initial ones were 20 Feb. 1864; 11 March 1865; 10 March 1866; 9 March 1867; 14 March 1868.

³⁶ This follows the attribution assumptions of Odlyzko (2019b), *op. cit.* (note 6).

³⁷ D. Hodgkins (2017) *George Carr Glyn, Railwayman and Banker*, Wolfe Press.

with some satisfaction, that, as he had warned before, most of the new companies had lost their elevated stock market valuations, and that “the opening of 1866 finds the world again sober enough to admit that no great discoveries remain to be made in finance, and that large and profitable businesses are not to be created by the paragraphs of a prospectus.” However, he further opined that the trough of valuations may have been reached, and that it was “probable that 1866 may witness considerable recovery.” In fact, though, the market decline that culminated in the “Black Friday” crash of 11 May was just then accelerating.

The extent to which even observers as knowledgeable and well-positioned as Newmarch were in the dark about what was happening in the markets is captured by a quote from an article he published two months after that “Black Friday.” He wrote there that³⁸

The public have wondered for a long time where all the money came from to make the hundreds of miles of new railway sanctioned by say 300 Railway Acts per session of the last few years. These Acts have authorised about fifty millions sterling of capital per annum for one kind only of fixed expenditure; and as the old mode of issuing prospectuses of new lines, and inviting the public to subscribe, has for a long time been given up, it has not been easy to understand the resources of the railway projectors.

Some of the language used by Newmarch in the quote above will be explained later, in particular how it was that “the old mode” had “been given up.” The point is that it was only the Overend, Gurney crash of 1866 (or, more precisely, the bankruptcies before and after the crash), which revealed the complicated web of financial obligations that hid where funds for construction were coming from that showed Newmarch some of what was happening in railway finance. In the “Commercial History and Review of 1866” he wrote that “[l]ooking back over the last four or five years, with the help of the disclosures now become public, it is more and more clear that the chief cause of the collapse of ’66 was the unsound and extravagant “financing” operations of Railway companies and Contractors.” The “unsound and extravagant” operations he was reacting to, however, involved primarily the multiplicity of new and small railways. Over the next year, leading to the railway share crashes of 1867, problems surfaced at the major lines. So in the “Commercial History and Review of 1867” Newmarch was led to note that “[t]he most prominent topic of the year has been the discredit and exposure which has overtaken several of the largest Railway Companies.” It was only then that he and Bagehot saw how deep and serious was the damage of “financial innovation” and accounting abuse.

The reason those huge flows of funds into railways could be obfuscated for so long and so effectively is that there was little solid information available. Governments collected only very limited economic and financial statistics, and companies, then as now, preferred to release as little information as possible. Even private banks did not publish any data about

³⁸ W. Newmarch, “The recent financial panic,” *British Quarterly Review*, vol. 44, July 1866, pp. 125–140. The passage cited in the text was followed in *British Quarterly Review* article by a reprint of a leader, “Finance paper’ and the rate of discount. A lesson for the future,” from *Economist*, 28 April 1866, pp. 497–98, which already showed an understanding of how railways were being financed. That leader, since it was reprinted in full by Newmarch in July of that year, may very well have been by him. See also the quote from *Herapath’s Railway Journal* a few days before the Overend, Gurney crash, *op. cit.* (note 19), that reflected the same belated recognition of what had been going on in railway finance.

their capital, assets, or liabilities. Some observers, including Bagehot, were advocating the conversion of private to joint stock banks on the grounds that this would force those banks to release at least some information. But even among public companies, what was released tended to be extremely limited. This was especially true for the new finance companies. They followed the example of the *Crédit Mobilier*, and were extremely secretive. In the face of demands from their shareholders for indications of how they were earning the splendid profits they were declaring, their managers claimed they could not reveal their “secret sauce” as that would harm their competitive position³⁹.

Accounting was in its infancy. The standard for joint stock companies was that their accounts were to be audited before each half-yearly meeting by two shareholders who were not in management. The British government sometimes imposed a few mild reporting requirements on joint stock companies, but those requirements were frequently ignored or evaded⁴⁰, and were often relaxed by later legislation⁴¹. The collapse of the Railway Mania of the 1840s led to accusations by investors that company directors had led them astray by fiddling with the accounts, and resulted in appointments of many shareholder committees of investigation. The complexity of those accounts, though, persuaded shareholders to bring in professional accountants⁴². This resulted in a huge boost for the accounting profession, with many of the firms in that area that are prominent today tracing their origins to that period. It also led many railways⁴³, but in general not other companies at that time, to start relying on professional outside accountants for their audits, in addition to the shareholder auditors. Of course, as the last century and a half has shown, this was always a cat-and-mouse game, with the professional accountants only creating a small obstacle to the creative impulses of managers.

Although there were many calls in the late 1840s for the government to step in to insure better railway accounts, including recommendations from House of Lords committee hearings in 1849⁴⁴, no action was taken. Since there were no accounting standards, directors

³⁹ While much of the press did complain about the lack of transparency, managers’ policies did have support among outside observers. Thus the *Shareholders’ Guardian* in its issue of 9 May 1866, so the day before Overend, Gurney closed its doors and precipitated the crash of 1866, disparaged shareholder critics of the *Crédit Foncier* and *Mobilier* of England, Albert Grant’s principal creation, who were requesting information about their company’s holdings and transactions. It called their demands “most preposterous and unreasonable.”

⁴⁰ House of Commons investigation of insurance companies in 1853 considered general accounting transparency issues among all companies. It reported that the requirement imposed in 1844 for annual reporting of balance sheets was ineffective, because “the Act prescribed no form, and furnished the Registrar with no power to enforce a compliance with the spirit, or even with the letter, of the law,” and therefore “it appears that this provision had been very imperfectly complied with in many cases, and in others altogether neglected.” United Kingdom (1853) *Report from the Select Committee on Assurance Associations*, Parliamentary Papers 1852-53 (965) XXI.1.

⁴¹ Cf. Hunt (1936) *op. cit.* (note 5).

⁴² A. M. Odlyzko (2011) “The collapse of the Railway Mania, the development of capital markets, and the forgotten role of Robert Lucas Nash,” *Accounting History Review* vol. 21, no. 3, Nov. 2011, pp. 309–345, with an extended preprint, with additional material, available at (<http://ssrn.com/abstract=1625738>); A. M. Odlyzko (2012) “The Railway Mania: Fraud, disappointed expectations, and the modern economy,” *J. Railway & Canal Historical Society*, no. 215, Nov. 2012, pp. 2–12. Preprint available at (<http://www.dtc.umn.edu/~odlyzko/doc/mania06.pdf>).

⁴³ But definitely not all, with the London, Brighton, and South Coast Railway that will be discussed at some length later, one of many exceptions.

⁴⁴ United Kingdom (1849a) *First and Second Reports from the Select Committee of the House of Lords on Audit of Railway Accounts*, Parliamentary Papers 1849 (371) X.1, 313; United Kingdom (1849b) *Third Report from*

had a lot of leeway in presenting their financial results. As railway investors learned to their sorrow in 1866 and 1867, this produced many grossly misleading financial reports. Although contemporaries and many later writers frequently claimed extensive accounting fraud by railway managers during the Railway Mania of the 1840s, there does not appear to have been much of it⁴⁵. Even the disgraced “Railway King,” George Hudson, whose “make things pleasant” comment in instructions to falsify some revenue accounts was frequently cited for several decades, did not commit accounting fraud on a massive scale. On the other hand, there actually was massive distortion of accounts during the 1860s.

The level of distrust in railways that resulted from the financial crashes of 1866 and 1867 did finally lead the government to step in, and enact “The Regulation of Railways Act, 1868,” 31 & 32 Vic. c. 119, which required railways to produce standardized reports. This was the very first British government mandate for audits of any private industry⁴⁶.

Even when information was available, it was not always processed properly. A study of Bagehot’s evaluations of the mania of the 1860s showed that he failed to pay attention to some statistics that were readily available, in some cases in his own *Economist*, that would have shown him that investments in railways were far higher than he thought⁴⁷. Had he been aware of that, he might have been more alarmed by what he saw in the markets, and might have put more effort into investigating what was happening. As it turns out, some of the mistakes in this area that led him astray have never been rectified, and continue to distort modern scholarly literature. We next explore this issue in a bit more depth. This issue will also be considered in the next section.

The previous section cited statistics on the number and nominal capitalization of newly formed joint stock companies in the 1860s. Those figures were taken from a 1927 book by L. Jenks that is still regarded as a standard source⁴⁸. That book, in turn, drew on statistics compiled and published in 1870 by Leone Levi, a respected legal scholar and economic statistician who wrote extensively on finance⁴⁹. What neither Levi nor Jenks noted is that the source for those statistics, namely data from the Registrar of Joint Stock Companies, included only a handful of domestic railways. While 1844 legislation required railways to go through the initial step of “provisional registration,” that step was abolished in the limited liability legislation of the mid-1850s. Companies that applied to Parliament for acts that provided limited liability and the power for acquisition of land were allowed to bypass the

the Select Committee of the House of Lords on Audit of Railway Accounts, Parliamentary Papers 1849 (421) (421-II) X.469, 581.

⁴⁵ There are several detailed investigations in papers of Arnold and McCartney, such as S. McCartney and A. J. Arnold (2001) “A vast aggregate of avaricious and flagitious jobbing? George Hudson and the evolution of early notions of directorial responsibility,” *Accounting, Business & Financial History*, vol. 11, no. 2, July 2001, pp. 117–143. See also Odlyzko, *op. cit.* (note 42).

⁴⁶ Even Bagehot, a staunch advocate of *laissez faire*, became convinced that government intervention was necessary in the wake of the disasters of 1866–67 to allay investor concerns. See *Economist*, 7 March 1868, pp. 263–64, “The recent railway meetings, and the necessity for a government audit,” or even earlier leaders, such as that in the issue of 28 December 1867, pp. 1469–70.

⁴⁷ Odlyzko (2019b), *op. cit.* (note 6).

⁴⁸ Jenks, *op. cit.* (note 20).

⁴⁹ L. Levi (1870) “On joint stock companies,” *Journal of the Statistical Society of London*, vol. 33, pp. 1–41. He published an update in the same journal, vol. 49, June 1886, pp. 241–64, which had slightly modified figures, but did not correct for the major deficiency discussed here. Some of the other defects in the Levi compilations are discussed in Shannon, *op. cit.* (note 22).

regular registration procedure, and simply did not show up in the standard reports on creation of new companies.

In the 1860s there were relatively regular reports to Parliament of newly registered companies⁵⁰, but those, just like Levi's compilations, only covered the companies that did register. Further, those did not seem to be cited in the *Economist*. Instead, both Bagehot and Newmarch appeared to rely on annual listings that were compiled by the brokerage firm of Spackman and Sons, and were published in *The Times* at the end of each year or the beginning of the following one. Those were republished by Newmarch in his "Commercial History and Review" for each year. Newmarch did not just reprint what was published in *The Times*, but made it more informative by rearranging the listing so that new companies were listed by industry, not just alphabetically.

The Spackman lists were (as was specified in the fine print) based just on companies that did solicit new capital from the public. Presumably they were based on published prospectuses. But many companies, especially new railway schemes, did not publish prospectuses. (Those were a part of "the old mode" that largely had "been given up," in the previously quoted words of Newmarch.) Hence the Spackman lists covered only some of the companies, even among the non-railway ones. For example, the data from Levi's article, later republished by Jenks, claimed there had been 975 companies registered in 1864, with nominal capital of £235 million. The Spackman lists for that year included just 282 companies with nominal capital of £156 million. But that was just its second most serious defect.

The principal problem with the Spackman lists was neglect of the bulk of domestic railways. Consider, for example, the list in the "Commercial History and Review of 1864," as arranged in the *Economist*. It shows the total of the nominal capitalization of railways that were set up in 1864 as coming to £12.5 million, with domestic railways accounting for just £2.1 million. This should have been seen as preposterous by anyone even slightly familiar with what was happening in the railway industry. In fact, it was wildly inconsistent with other information just a few pages away in that same supplement. Starting from its original version covering 1863, the "Commercial History and Review" included a section on "railway traffic" (meaning revenues) for that year (and 6 preceding ones) that was reprinted from *Herapath's Railway Journal*. That railway weekly published in one of the first issues of each year, from 1843 to 1873, a statistical study by J. T. Hackett. This author provided data on revenues of the main British railways for each week of the year. He thereby likely helped educate the British public about the usual seasonality effect on revenues, and also about the continuing growth in industry revenues, a topic to be considered at the end of this work. Hackett typically also provided some other data and commentary. In particular, in his article covering 1864, he noted that Parliament that year sanctioned construction of 1322 miles of additional track, with authorized capital (equity and loan) of £63.5 million. This was a striking contrast with the £2.1 million of the Spackman list. Similar contrasts also occurred in other years. Yet Newmarch did not note the huge discrepancy, and continued publishing two wildly inconsistent estimates of railway investment year after year!⁵¹

⁵⁰ For example, Parliamentary Papers 1864 (452) LVIII.291.

⁵¹ It was only in the "Commercial History and Review of 1867" that Newmarch, in his own overview of the markets, and not incidentally in the reprint of Hackett's pieces, noted the very high number of railway bills passed by Parliament. A table showed that in the years 1862 through 1867, 1776 bills were brought to Parliament, 406 were

As was noted earlier⁵², Bagehot relied on a study that he appears to have commissioned, or performed himself, which suggested annual savings in Britain were in the range of £130 million per year⁵³. The Spackman list for that year included projects with total nominal capital of £156 million. However, Bagehot argued that among the newly registered companies, (i) many projects were likely to be abortive, (ii) most would only call up a fraction of their nominal capital, and (iii) many represented existing private companies going public, so the money raised from investors buying shares would simply go into the pockets of previous owners, and would not represent a new capital expenditure. Hence only a small fraction of the £156 million would have to be raised from capital markets, and this would not disturb the financial scene. But this analysis unfortunately ignored railway investments.

Newmarch's "Commercial History and Review of 1865" was cited above for his belief that the worst was over just two months before the Overend, Gurney crash. But it also included a reprint of Hackett's statistics on railway traffic⁵⁴. In it, Hackett noted that in the previous two years, Parliament had passed about 485 railway acts authorizing expenditure of over £100 million, which he noted, with the knowledge common among all industry observers about the notorious underestimates of costs, would be "more probably, before they are done with" £150 million. Now not all those projects were completed, and even those that were going to be completed were going to take several years, but this clearly represented a flood of money far beyond anything Bagehot or Newmarch were aware of. These were the funds that would pay for construction labor, but also for rails, locomotives, bricks, and a variety of other goods, and would spur all of British industry, and would account for much of the quickening of the national economy that those observers noticed. They would also lead to the financial debacles of 1866–67.

Railways, the giant but still immature industry

By 1860, railways were by far the most visible industry in Britain, and the one with capitalization that dwarfed all other private enterprise. The concept of GDP had not yet been invented, and public opinion did not concern itself with the size of the economy very much. Instead, what dominated public discussions was the size of what was perceived as the gigantic, oppressive, and dangerous public debt. Britain emerged from the Napoleonic wars with national debt well over twice its GDP. Over the course of the 19th century, the volume of that debt did not diminish much, but the economy grew, so that by the 1860s, debt was about equal to GDP. In the meantime, railways came along, and by the 1860s the total value of their debt and equity securities reached about half the size of the national debt, as is shown in Table 1. Hundreds of thousands of the British middle and upper

withdrawn, 274 rejected, and 1090 were enacted. (And yes, the numbers don't add up, there is an arithmetic mistake, or else a typo, the total number of bills likely was 1770.)

⁵² Odlyzko (2019b), *op. cit.* (note 6).

⁵³ A good illustration of the highly deficient state of information about the economy is that *Money Market Review* cited an estimate of £70 million, but later mentioned it might be as high as £200 million, see that paper for 11 July 1863, p. 28 and 2 April 1864, p. 368.

⁵⁴ Those were originally published in *Herapath's Railway Journal*, 6 January 1866, pp. 2–3.

classes depended on the income from their holdings in this industry. All other industries put together were a fraction of that.

Yet calls for extensions of the railway system were not abating. One can draw analogies to the current (that is, of the year 2021) discussions of broadband. Just three decades earlier, established telecommunications companies sneered at the Internet, and often tried to impede its progress. But now, especially after Covid-19, it is perceived as essential. But there are numerous underserved parts of even rich developed countries, and the question is how to link them up with adequate capacity. The established service providers resist expansion, as it would dilute their profit margins.

Similar resistance was displayed by railway shareholders in the 1860s, with their frequent calls to stop construction of branches and extensions, and for Parliament to limit new lines. Even Bagehot accepted that view, and in early 1865 claimed about new railway projects that “[e]very one knows that there is no real desire on behalf of the public for most of these schemes,” and that they were concocted by lawyers and engineers for their own enrichment⁵⁵. However, the “everyone” he had in mind covered only railway investors. On a national scale, it could not have been more wrong, most likely even for most readers of the *Economist*.

In Britain, railways did arouse much early opposition, as is well documented in railway history. The pioneering Stockton and Darlington Railway had to be re-routed to avoid an aristocrat’s fox-hunting grounds, and Cambridge, Eton, and Oxford insisted on special provisions in acts enabling railways to their vicinity to minimize the chances of their students travelling to the fleshpots of London. The noisy, smelly, and generally disruptive new technology was treated with great suspicion. But by 1860s, the prejudice against railways had dissipated, and they were perceived as essential. Localities with railway service clamored for more, and those without worried about being left to wither. Much of the early opposition to railways came from landowners. But by the 1860s we find considered opinions that “there is no improvement so economical to the landowner as that which railways secure”⁵⁶.

At the beginning of 1864, two knowledgeable figures who were well-connected in the railway industry, Edward McDermott and Samuel Smiles⁵⁷, established a new weekly, the *Railway News* (to compete with two other, much older, widely circulated railway weeklies, *Railway Times* and *Herapath’s Railway Journal*). It was oriented towards investors and managers of established companies, which were strongly opposed to railway extension, but it felt compelled to acknowledge this could not be stopped⁵⁸:

⁵⁵ *Economist*, 14 January 1865, p. 36, leader “The political cost of railways.”

⁵⁶ Presentation “On the future extension of the railway system, with special reference to the influence of railways on landed property and agriculture,” by J. B. Denton, to the Institution of Surveyors in 1869. The main lecture, which had many citations supporting the thesis, and ensuing discussion occupied three meetings of that society, and are presented in *Transactions of the Institution of Surveyors*, vol. 1, 1869, pp. 127–186.

⁵⁷ McDermott (1820 - 1903) was a versatile journalist who had worked for several London papers. Smiles (1812 - 1904) is today remembered either for his biographies of eminent engineers, or for his pre-eminent role in propagating the “self-help” philosophy. However, he also had had extensive experience in journalism, and a record of almost two decades of work in railway management, including employment as Secretary of the South-Eastern Railway from 1854 until almost the end of 1866.

⁵⁸ *Railway News*, 9 September 1865, p. 279, leader entitled “Next session—More railways!”

The old companies can no more prevent new railways being made than they can stop the action of the law of gravitation. ... The district without a railway is in these days a district behind the age. It is, in a measure, left outside the pale of civilisation.

Even before “The Companies Act, 1862,” was enacted, and formation of joint-stock enterprises exploded, there was constant agitation for railway extension. Fig. 2 shows considerable capital expenditures even in the late 1850s. (That it was considerable, when compared with other British investments of that period, will be shown in the next section.) In early 1861, Parliament had before it applications for 240 railway projects, half from new ventures, half from established lines, which, were all to be realized, would have added another 3,000 miles, or about 30%, to the national network⁵⁹.

The problem, just like today with broadband access, was financing the desired degree of connectivity. But it was far more severe, in that today, in the most developed countries, only about 1% of GDP would be required to remedy the deficiencies. In the 1860s, more than an order of magnitude higher investments were called for.

The inaugural issue of *Railway News* noted that improved financial results and prospects of railways were making them more attractive to investors (a widely shared opinion, as it was also expressed in a leader in *The Times* almost a year before⁶⁰), but it also noted the wide opposition of shareholders of established lines to network extensions, since⁶¹

the extension of the parent line has in so many cases been followed by a reduction in the net receipts, and the opening of new branches has so frequently been followed by smaller dividends, that the impression has gone abroad and even become embodied in the railway maxim that “*branches are suckers, not feeders.*”

As a way to reconcile the need for more railways with investors’ reluctance to finance them, *Railway News* recommended less expensive construction and operation approaches to branches, not following the gold-plated standards applied to mainlines⁶².

Other observers were advocating different approaches. Since just about everyone agreed that landowners and businessmen derived great benefits from railway expansion that were not captured in industry revenues (what we not call “network externalities”), there were suggestions that localities should tax the real estate that was a direct beneficiary to fund railway expansion⁶³.

There were even more drastic suggestions, including government takeover of railways. Even Bagehot, a *laissez faire* stalwart, became an advocate of that position, although for

⁵⁹ *The Times*, 1 March 1861, p. 5, debate in the House of Lords.

⁶⁰ *The Times*, 9 February 1863, pp. 8–9. The optimistic view of railway investments was reinforced by the success of the Metropolitan Railway, the world’s first subway. It opened in early 1863, was embraced enthusiastically by the public, and had high earnings that disproved the widespread skepticism that had faced it during its long gestation.

⁶¹ *Railway News*, 2 January 1864, first two leaders, “The railway interest,” and “Cheap railways,” pp. 3–5.

⁶² Calls for less expensive construction of branches were common. Another example is the leader “Branch lines” in *Herapath’s Railway Journal*, 23 January 1864, pp. 87–88. Some observers went so far as to explicitly adopt the American approach to railway construction.

⁶³ This was advocated by many, for example R. D. Baxter (1866) “Railway extension and its results,” *Journal of the Statistical Society of London*, vol. 29, Dec. 1866, pp. 549–595. And he was not the first. Claims of large social benefits can be found in the letter “Lord Redesdale and railway legislation” in *The Times*, 4 June 1866, p. 5, and in the leader “Lord Redesdale on railways” in *Economist*, 19 May 1866, pp. 584–85.

a variety of reasons, not just to promote faster expansion⁶⁴. In the end, none of these approaches were taken. Instead, “the roving cavaliers of credit,” acting in concert with railway contractors, lawyers, engineers, and other players, managed to achieve a very expensive and inefficient expansion of the railway network by misleading other players, often innocent and naive investors, into providing the necessary funding.

Locality of traffic

Before launching into more detailed expansion of the railway mania of the 1860s and how it unfolded, we should say a few words about one of the factors that confused discussions and decisions about railway expansion. Other such factors will be considered in the concluding sections, but this one is so important that we take a brief detour to discuss it. The quote above from the first issue of the *Railway News* cited “the railway maxim that ‘*branches are suckers, not feeders*’.” This maxim arose from the bitter experience of investors during the Railway Mania of the 1840s, but from which they drew an incorrect conclusion. In that episode of extreme investor exuberance, branches were justified on the grounds that they would be “feeders” to the main line, originating traffic that would travel long distances. Hence even if (or, more precisely, when) revenues of just those branches were poor, it was claimed the company would benefit. However, what only a few observers noticed, was that most traffic was local⁶⁵. Therefore branch construction did not lead to the expected cornucopia of profits. Instead, there were big losses. This led to the maxim that *branches are suckers, not feeders*. But that was not universally correct. Sometimes branches were feeders, sometimes they were suckers, and with general growth in traffic, suckers frequently became feeders. In fact, many of the contemporary claims of unproductive branches can be discounted to some extent because, as was recognized by quite a few observers at that time, the calculations that led to those claims did not include the benefits to the main line from those seeming “suckers” in feeding passengers and goods to the main line. Much of the disagreement as to the wisdom of railway expansion was based on different expectations of the traffic that was likely to be realized, and in particular of the value of branches and extensions for main lines. As will be discussed later, this represents a great missed opportunity, in that a tool that is standard in modern transportation planning had been discovered during the Railway Mania of the 1840s. This was the “gravity model” that was found by the engineer Henri-Guillaume Desart through statistical analysis of a large data set of travel densities on Belgian railways⁶⁶. Unfortunately Desart’s work was not used

⁶⁴ For example, the leader “The advantages that would accrue from an ownership of the railways by the state,” *Economist*, 7 January 1865, pp. 1–3. Others who also took that position included Smiles, after he left his position at the South-Eastern Railway, in his article “The great railway monopoly” in *Quarterly Review*, vol. 125, October 1868, pp. 287–329.

⁶⁵ A. M. Odlyzko (2010) “Collective hallucinations and inefficient markets: The British Railway Mania of the 1840s,” manuscript available at (<http://ssrn.com/abstract=1537338>); A. M. Odlyzko (2015) “The forgotten discovery of gravity models and the inefficiency of early railway networks,” *OEconomia*, vol. 5, no. 1, pp. 157–192, with online journal version at (<http://oeconomia.revues.org/1684>); A. M. Odlyzko (2019) “Dionysius Lardner, the denigrated sage of early railways,” pp. 39–58 in *Early Main Line Railways 2: Papers from the Second International Early Main Line Railways Conference*, M. Chrimes, ed., Croydon, preprint available at (<https://ssrn.com/abstract=3445470>).

⁶⁶ Odlyzko (2015), *op. cit.* (note 65).

properly during the Railway Mania, and was totally forgotten soon afterwards. Had it been widely known and accepted, and the necessary British data collected, it would surely have led to much better railway network design and fewer losses to investors.

It is amusing and instructive to note that lack of appreciation for the importance of locality is almost an absolute rule. It applied to the Internet, too. Its predecessor, the Arpanet, was designed to connect remote locations, but it was quickly discovered that one of its most valuable applications was local email. (As another example of almost constant misunderstanding, the conscious decision not to make email a design criterion for the Arpanet was an instance of the underappreciation of the value of connectivity.)

Just how oblivious people can be to the importance of locality is also shown by the case of the Metropolitan Railway, the world's first subway line, which opened in London in January 1863. It had faced serious skepticism over the decade it took its promoters (led by Charles Pearson) to get it built, with the crucial final investment piece coming from the municipal government of London. It was perceived as a great success right from the start, both in terms of the service it provided to the public, and financially. Its financial success helped stimulate a mania for other lines in the London metropolitan area, and spurred the general railway mania of the 1860s. The interesting point is that initially this line was conceived primarily as a way to connect large railway stations and to bring traffic from those stations to the City, the commercial heart of London, so it was a short line. It took a long time for the public to realize most of the traffic on it was even more local, with inhabitants of London traveling between local stations.

The railway mania of the 1860s

Bagehot and Newmarch took a long time to realize that many of the financial market anomalies that bothered them often resulted largely from, and were sustained by, the huge flows of money into railways. Just how large those flows were is still not known precisely. This is one of the interesting questions that hopefully will be clarified by further research. The two figures cited in the preceding section, of £2.1 and £63.5 million per year, were both extremely inaccurate. Unfortunately, all available estimates are clearly distorted to a substantial extent by the “creative financing” of the 1860s. Fig. 2 provides information on railway investments from that period that are drawn from standard and widely quoted sources⁶⁷. It shows railway investment peaking at about £30 million in 1865, about four times the level of 1857 and again of 1869. However, that reflects only capital raised by methods authorized by Parliament. It omits other funds, in particular Lloyd's bonds, which will be discussed later⁶⁸. But those numbers come from a consistent series of government statistics, and are good enough for our purposes, so we will use them.

⁶⁷ United Kingdom (1876) *Railway Returns for England and Wales, Scotland and Ireland, 1875*, Parliamentary Papers 1876 [C.1540] LXV.117.

⁶⁸ In principle, Lloyd's bonds only shifted the timing when investments would show up in the official statistics, but due to bankruptcies and other complications this likely did not hold perfectly in practice. There were other distortions too, such as those related to the infamous “watering” problems that were endemic in American railroad finance, but showed up in Britain as well. Companies would sell their shares below the par value, so the cash they received was less than what showed up in the official capitalization figures.

How large were the distortions of “financial innovation” in the 1860s is not known. For example, for Lloyd’s bonds, one concrete estimate, of uncertain provenance and quality, has been found, that their outstanding amount might have been around £30 million⁶⁹. But that seems implausibly high. There are also estimates of various securities connected with the “creative finance” of that period, which, however, may or may not include Lloyd’s bonds. One of them, very likely by Newmarch, and dating to just before the Overend, Gurney crisis, was of “not less than” £5 or 6 million. The other, possibly also by Newmarch, but three months after the crisis, was of £8 to 10 million⁷⁰. It is noteworthy that at least one of those last two estimates can be connected to Newmarch. He continues to be cited in the modern literature, for example, for his careful study, based on a very large data collection effort, of the volume of bills of exchange (which will show up in a later section). Yet in this context he could only offer a vague estimate with a large range.

Whatever the correct figures, they were large relatively to the overall capital investments in Britain in the 1860s. The GDP was around £900 million in this period⁷¹. So spending £30 million per year might not seem very much in our era, when China was devoting close to 50% of its GDP to capital investments in the 2010s. But back in the 19th century, it took a long time even for countries at the forefront of the Industrial Revolution to increase their capital investments much above 10% of GDP, and the GDP annual growth that amazed the Victorians in mid-19th century was still under 3% per year, not the 10% that China, and before her, Japan and the Asian Tigers, had attained. The most recent and widely cited studies for capital formation in Britain are those of Feinstein and Pollard and they show, among various other estimates, that what they call “gross fixed capital formation” grew from £59 million in 1860 to a peak of £91 million in 1865, with railways going from £9.0 million to £22.8 million in that stretch⁷². Thus railway construction was a large factor in the British economy of the 1860s, and its effects were spread through various industries, such as iron production, brick manufacture, food supplies for workers, and so on. It also stimulated the economy in less direct ways. For example, it pumped money into the pockets of landowners whose possessions were being acquired for railways. (As Marx

⁶⁹ *The Times*, 23 June 1864, p. 12. Another seemed to suggest 11 million, *Money Market Review*, 24 September 1864, p. 368. Lloyd himself, when testifying before a committee of the House of Lords, could only say that he believed there were his “bonds to the amount of some millions ... out among the public,” United Kingdom (1864) *Select Committee of House of Lords on Railway Companies’ Borrowing Powers*, Parliamentary Papers 1864 (518) XI.43, Q117. But the “some millions” must have amounted to quite a few millions. The ill-fated and giant London, Chatham, and Dover Railway had, all by itself, Lloyd’s bonds outstanding to the amount of £1.276 million at the end of 1863 (*Herapath’s Railway Journal*, 27 October 1866, p. 1181). Other large issuers can be identified as well, and two are cited in a later section.

⁷⁰ The first estimate occurs in a leader in the *Economist*, 28 April 1866, pp. 497–98. Leaders are usually ascribed to Bagehot, but this one is reprinted in Newmarch’s article “The recent financial panic” in *British Quarterly Review*, July 1866, pp. 125–140, so is assumed to have been written by Newmarch. The second estimate occurs in “The financial pressure and ten per cent” in *Fraser’s Magazine*, August 1866, pp. 229–242, which is sometimes attributed to Newmarch, but apparently without solid confirmation. That last article has some descriptions of how the ‘finance-paper’ “was put into circulation in all sorts of ingenious forms.”

⁷¹ B. R. Mitchell (1988) *British Historical Statistics*, Cambridge.

⁷² C. H. Feinstein and S. Pollard, eds. (1988) *Studies in Capital Formation in the United Kingdom, 1750–1920*, Oxford, Table I, p. 427, and Table II, p. 429. These estimates are distorted, like most other ones, by the “creative finance” involving railways, since Feinstein and Pollard rely on the official statistics that are the basis for Fig. 2. Also, their figures are somewhat different than those used for Fig. 2, since they adjust the official statistics to remove capital that was raised by railways but used not for construction, but for activities such as land purchase.

noted, “the roving cavaliers of credit” often do provide nice business for various industries, they generally don’t just pocket the money they get from investors.) Hence much of the prosperity that Bagehot, Newmarch, and other observers noted was almost surely the result of the huge sums pouring into railway expansion.

Table 2 gives some figures for the growth of the British railway system, again based on the distorted official figures. The investment of about £240 million by 1850 consisted of about a third, or £80 million, arising from the (successful for investors) railway mania of the 1830s, and two thirds, or about £160 million, from the big (and disastrous for ordinary share investors) Railway Mania of the 1840s. The mania of the 1860s absorbed about £170 million, so just about as much as the Railway Mania, and added about as much rail mileage. At that time, £170 million was close to 20% of GDP, and most of it was spent in about four years. By comparison, the largest recent public transportation infrastructure project in the UK has been Crossrail, which apparently will end up costing about £20 billion, or about 1% of GDP, and will have taken about a decade. The projected HS2 is supposed to cost about five times as much, or about 5% of GDP, and will take considerably more than a decade. So the railway mania of the 1860s dwarfs those modern projects, and it was funded completely by private investors, who built out public networks in pursuit of chimerical private profits.

Table 2. Expansion of the British railway system.

| year | miles of railway | capital authorized £ millions | capital paid up £ millions |
|------|---------------------|-------------------------------------|----------------------------------|
| 1850 | 6,621 | 362.8 | 240.3 |
| 1855 | 8,335 | 375.0 | 297.6 |
| 1860 | 10,433 | 399.4 | 348.1 |
| 1865 | 13,289 | 576.3 | 455.5 |
| 1867 | 14,247 | 642.9 | 502.3 |
| 1870 | 15,537 | 596.2 | 522.9 |

The Overend, Gurney crash of the spring of 1866 arose when the financial magic conjured by the “roving cavaliers of credit” could no longer sustain the “beautiful illusions” that had been created. Railway contractors and finance houses started imploding already in 1865, and the frequency of such disasters grew in 1866. Finally, on 10 May 1866, one of the greatest financial institutions in Britain, the discount house of Overend, Gurney, closed its doors, and almost right away one of the largest railway contractors, Peto and Betts, also had to suspend payments. That produced the crisis of 1866, which some contemporaries claimed was among the most severe in British history, on a par with that of 1825. It was resolved by the government suspending the gold standard and the Bank of England following the Lender of Last Resort recipe that would be enshrined into modern central bank dogma by Bagehot in *Lombard Street*.

The Overend, Gurney crisis was widely recognized as primarily a financial one, with the usual panic about safety of not just basic bank balances, but about the entire intricate

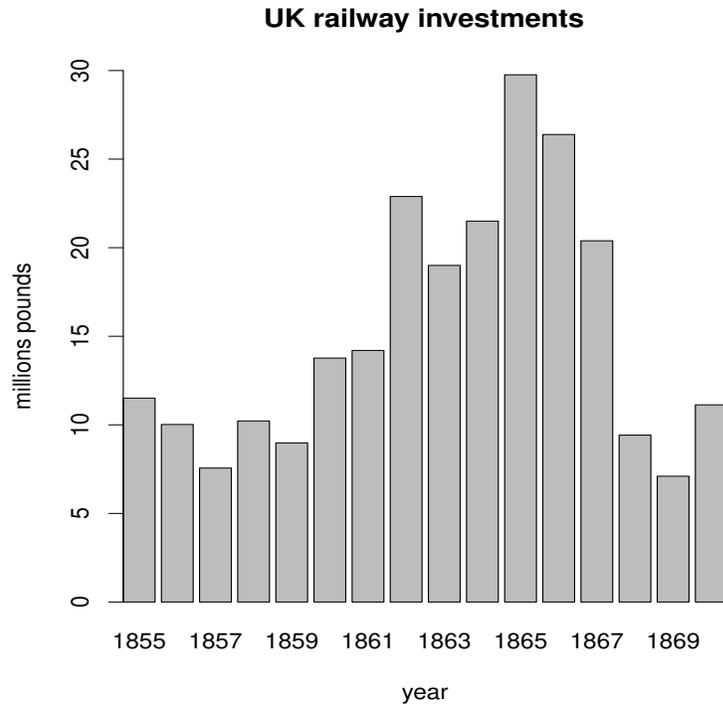


Fig. 2. Additions to the official paid-up capital (shares, debentures, ...) of UK railways, 1855 to 1870. Does not reflect fully the distorting effects of “creative finance” of the early and mid-1860s, which involved capital commitments not captured in the official figures reflected in the bar plot.

structure of credit relationships that was key to the functioning of the economy. Most of the established railways did not seem to be affected much by the turmoil of early 1866, although their share prices did drop, as is visible in Fig. 1. However, over the next year a series of revelations shook the faith of investors in the solidity of those institutions, as the real economic results of the mania became apparent. It turned out that much of the railway expansion visible in Fig. 2 and Table 2 was being carried out by the large railways, in ways that had been hidden from shareholders, and often did involve the contractors and finance houses that had seemingly been purged by the crisis of 1866. The relationships were often indirect, as will be discussed in the next two sections and also at the end, in the section on examples of extreme railway finance. These large, established, and seemingly stable railways were discovered to be saddled with huge increases in their capital, and newly opened branches that were unprofitable. Many of the established railways were brought to the brink of bankruptcy, and a few beyond it. That led to a crisis in 1867. Some observers felt that had the Overend, Gurney failure not occurred in 1866, the financial and economic

systems would have continued to function only to collapse in a much more damaging crash in 1867⁷³.

In May 1866, pleas from financiers and merchants led the government to the drastic step of suspending the gold standard to avoid what threatened to be a seizure of the financial system. In March 1867, though, similar pleas for assistance for railways were turned down, even though they represented a far larger industry. The pressing problem in 1867 was inability of even the most prominent railways to renew their loans (a topic touched upon later). It was of a different nature than the threatened seizing up of the financial system in the Overend, Gurney crisis. This time there was not the same urgency, as the damage was not concentrated in a few key institutions, and there were not hordes of people who could demand their money back right away. So the government let the problem take care of itself, which it did, but, of course, with huge damage to large classes of investors.

An accurate accounting of how the damage from the investment mania was distributed is still to be obtained. In the rest of this work we concentrate on the methods that resulted in this damage.

Contractors' lines

Railway history as well as general business history literatures frequently cite, usually in derogatory terms, the prominent role that “contractors’ lines” played in the mania of the 1860s. There is no precise definition of these railways. It did not mean lines built by contractors, as that category covered practically all railways. Lord Redesdale, one of the most knowledgeable people about railways in Parliament, and the most prominent opponent of such lines there, wrote in 1867 that⁷⁴:

A railway is generally understood to be a contractor’s line when a contractor undertakes to construct it, taking the capital of the company under his control and finding the money for the work. ... In such arrangements the work is generally agreed to be executed at a scale of prices from 30 to 40 per cent. above what the actual cost price would be if the company found the money to pay for it.

The general role of contractors’ lines was summarized half a century later by a business historian in the following terms, which are not inconsistent with Redesdale’s characterization⁷⁵:

... there was a tendency, which reached its proportions between 1852 and 1866, for the original relations between railway companies and their contractors to be reversed. Instead of people desirous of building a railway employing men to build it, contractors built railways and organized companies to sell what they had made. To his burden of technical responsibility for the railway plant, to the task of assembling

⁷³ This was Bagehot’s approving summary in *Economist*, 1 February 1868, pp. 117–18 of comments made by a Manchester banker interested in economic statistics at a discussion of the work of John Mills (1868) “On credit cycles, and the origin of commercial crises,” *Trans. Manchester Statistical Society*, session 1867–68, pp. 9–40. The Mills paper is available online at (<https://books.google.com/books?id=0Ec9AAAAYAAJ>).

⁷⁴ Letter entitled “The Great Eastern Railway,” *The Times*, 5 September 1867, p. 5.

⁷⁵ Jenks, *op. cit.* (note 20).

the elementary factors of production, the contractor added the hazard of its business success. Thru him bonds were negotiated, bankers' accommodation secured.

Both quotes reflect the fact that what characterized contractors' lines was the heavy involvement of contractors in the financing of those lines. Such railways were frequently blamed by contemporaries for the disastrous investment outcome of the 1860s⁷⁶. This point of view is presented, with a variety of citations to observers from that period and later, in the book of Popplewell⁷⁷. These very negative views of contractors' lines were recently counterbalanced by the study of Cross-Rudkin⁷⁸, who examined a selection of railways that had been characterized as contractors' lines, and showed that the stereotype description does not apply to them. Pollins has written a good general overview of contractors and their role in financing railways, with many specific examples of the varied ways these contractors operated and interacted with the railway industry⁷⁹.

A general overview of railway contractors is available in the book of L. Jenks⁸⁰. They were an important factor in the development of the British (and world) economy. Their innovative operational structures and methods, which enabled operations not just in different regions of a country, but across national boundaries, appear not to have been documented adequately, and continue to be underappreciated. Contractors have continued to be employed almost universally for large construction projects to the present day, and not just in the railway industry. What has changed is that after the crisis of 1866, they ceased to play a substantial role in financing British railways. In the "Commercial History and Review of 1868," Newmarch wrote that "[o]ne of the plainest results of the calamities of 1866 is the proof they afford of the almost entire incompatibility of the two functions of Contractor and Financier."

Newmarch's opinion was based on the almost universal belief that contractors' lines were largely responsible for "the calamities of 1866." This was added to the generally unfavorable view that the press and railway investors had of such railways from early days⁸¹. However, there were also voices that supported contractors and acclaimed their role in the expansion of the railway network. While the railway mania of the 1860s was in full swing, and there was a debate in Parliament about a proposal to strengthen some of the regulations that were being evaded, Thomas Coates published a strident defense of the existing system⁸². His main point was the same as that of other defenders of contractors' lines, namely that

⁷⁶ See for example the long letter of "Z." in the financial column of *The Times*, 16 March 1867, p. 10. However, unlike some observers, this writer, who will be quoted later, noted that contractors' lines were not the only cause of the investment disaster.

⁷⁷ Popplewell, *op. cit.* (note 20).

⁷⁸ Cross-Rudkin, *op. cit.* (note 20).

⁷⁹ Pollins, *op. cit.* (note 20).

⁸⁰ Jenks, *op. cit.* (note 20).

⁸¹ This can be seen, for example, in Anonymous (1857) *Petovia; Being a Review of the Scheme for a Railway from Pitsea to Colchester, ...*, London. Available online at (<https://books.google.com/books?id=AKpVAAAAcAAJ>).

⁸² T. Coates (1864) *Railway Deposits Discussed in a Letter to the Chairman of the Committee*, London. Available online at (<https://books.google.com/books?id=p6RVAAAAcAAJ>). Coates was a Parliamentary agent, one of a small group of specialists in guiding Private Bills through Parliament. Thus he had a strong interest in keeping up the flow of new proposals, any new proposals, as those depended on his expertise, and provided him with an income.

established railways would not extend their networks to meet the nation's needs. He wrote (pp. 7–8):

And so, by degrees, excepting in the case of existing and affluent Companies, the construction of Railways has been left in the hands of Contractors. And here let me give my poor meed of homage to a class of men who strangely enough are in this country often talked of with a sneer. For my part, I cannot help looking with reverence upon those who are covering the whole civilized world with monuments of their enterprise and their skill. Without them the intercourse of nations would be interrupted, and to them it is that this country, above all, owes a deep debt of gratitude.

Similarly positive, although much more tempered, words about contractors' lines were offered even after the Overend, Gurney crash, when the opprobrium heaped on those projects intensified. Some of the more interesting were a letter published in *The Times* a month after the crash⁸³, a pamphlet published by Richard France, a railway contractor, a year later⁸⁴, and a series of articles spanning several years, both before and after the crash, in *Saturday Review*⁸⁵.

Some of the positive evaluations of contractors' lines in the articles cited above carefully skirted a key issue, namely the fate of the people who ultimately ended up providing funding for them. Thus the last piece in *Saturday Review* that was cited could only bring itself to write that “[t]he objection to the mode of conducting business [by railway contractors] was not that it was essentially unsound, but that the terms were not understood by private debenture-holders.” Others were more forthright in applauding the fleecing of investors, as long as the public gained through construction of additional railways. The writer of the two letters to *The Times* that are cited in the preceding paragraph was explicit in saying that even overpriced railway construction that ruined investors provided a net benefit to the nation, because of all the ancillary benefits. That writer also declared

you cannot by standing orders or Acts of Parliament make men prudent or prevent rash expenditure of money. If speculators are prevented from spending their money in one way they will do it in another. What will probably happen will be that they will expend the capital upon some undertaking which is less certainly conducive to the general welfare than a railroad.

Many people were surely offended by such attitudes. A few months later, after extensive financial data emerged about the shenanigans at the London, Chatham, and Dover Railway, *The Times* declared in a leader⁸⁶ that

⁸³ *The Times*, 4 June 1866, p. 5, letter of “H.” on “Lord Redesdale and railway legislation,” with a followup by the same author in the same paper, 19 June 1866, p. 6.

⁸⁴ R. S. France (1867) *Lord Redesdale and the New Railways: A Review of His Lordship as a Railway Legislator*, London. Available online at (<https://books.google.com/books?id=zIIUGL-5XgCJ>). This was part of an extended debate between France and Lord Redesdale, much of it carried on through letters to *The Times*.

⁸⁵ Including those in *Saturday Review*, 12 December 1865, pp. 749–50; 16 June 1866, pp. 707–708; 26 January 1867, pp. 101–102; 29 June 1867, pp. 810–11. The last of those listed called railway contractors “a class of public benefactors.”

⁸⁶ *The Times*, 12 October 1866, p. 6

there can be no excuse for a purely fictitious and illusory compliance with Parliamentary regulations, and for borrowing money from the confiding public upon the pretence of work done that had not even been touched, and of shares taken and paid up that existed only in imagination. There can be no excuse for a process which has inflicted ruin on innocent people to the amount of several millions of pounds, plundering not only shareholders, who might lay in their account for some risk, but even those who thought they were lending sums of money to be repaid, after a stated term, to the very farthing.

In a similar vein, some months later, a railway paper, writing about the debates between France and Redesdale noted⁸⁷:

One of the most impudent productions of the day has been emitted from the pen of Mr. France, a railway contractor, and a speculator who has brought almost every person in any way connected with him in money matters into anxiety, vexation, and loss. ... we take the liberty of remarking that the production of Mr. France is eminently false in its pretences and delusive in its argument. It is quite true that several railways emanating from contractors have been opened for traffic in Wales. No mention is made by Mr. France, however, that some of these lines have since been closed, that the construction of others is arrested, and that the unhappy dupes who were led to embark their money in some of the concerns have lost every shilling they subscribed towards them. Not a penny of legitimately earned dividend has been paid upon any of the shares; much, if not all, of the interest paid upon debentures has been taken from capital; the contractors are generally bankrupt; ...

Yet the desire for more railways was strong enough that many were willing to overlook the damage to “the unhappy dupes.” Even *The Times*, that uniquely influential press organ, the voice and leader of the British establishment, came to the defense of contractors, and in opposition to Lord Redesdale’s attempts to curb them. Soon after the Overend, Gurney crash it published a leader which admitted contractors’ lines were wasteful, but did not mention how much financial loss they caused to investors⁸⁸. Its conclusion was that contractors’ lines were the only way to continue expanding railways: “Bar out the contractors, and you put an end to new Railways; for you exclude from the work just those persons who alone can be induced to undertake it.”

As it turned out, Redesdale’s proposed re-regulation measures were not carried out, but contractors were in effect barred from financial involvement in railway promotion. Their key role in deluding other market agents became universally known, and too many people had been “brought ... into anxiety, vexation, and loss” for their methods to work again. Hence after 1866, the finance industry had to find new ways of extracting money from investors.

⁸⁷ *Railway Times*, 23 February 1867, pp. 203–204.

⁸⁸ *The Times*, 6 June 1866, p. 10. This leader was published anonymously, as was the rule then, but the Editorial Diary for this paper, now at the Times Newspapers Ltd Archive, shows, as was kindly provided by Nicholas Mays, the Archivist, that the author was Henry Annesley Woodham. Woodham was a Cambridge academic who was a prolific contributor of leaders to *The Times*, and he wrote a large fraction of those on railways in the 1860s.

During the railway mania of the 1860s, though, contractors were a key part in the financing of railway expansion. They started getting involved in railway finance in the late 1840s, but initially on a limited scale, typically providing a small part of the capital⁸⁹. Their involvement varied from line to line, and also, even for a particular line, with time, as they became more deeply committed financially. It was common for contractors to get their own nominees on the boards of directors, for example, as their role grew. The contractors' engagement in the affairs of the lines they were building tended to become deeper in the 1860s, as the tempo of new line creation quickened, and also as government regulations were increasingly loosened or evaded. However, contractors may not have been involved in the earliest stages of promoting new lines too often. Further, while many of them had large assets, those were small compared to the huge sums required by the mania of the 1860s. Hence they became not principals providing funds for new railways, but agents procuring funds. The additional 30 to 40% they charged, as cited by Lord Redesdale in the quote at the start of this section (a premium that was frequently exceeded) did not simply go into the contractors' pockets. Those extra sums helped cover the financing cost, as various market agents demanded discounts to compensate for their risk in the search for "a greater fool" that securities could be sold to. There are many snippets illustrating various stages of the process. As just one example, we have the June 1864 testimony before a committee of the House of Lords about the Tewkesbury and Malvern Railway. The contractor initially was paid for each £5 worth of work with an ordinary share of nominal value £10. But then payments had to be switched to Lloyd's bonds, since he could not sell the shares for anything close to £5, and, at the time of the testimony, in the market "you would not get more than [£3]" for each⁹⁰.

Search for a greater fool

The Global Financial Crisis (GFC) of 2008 was facilitated by the creation and dissemination of complicated financial instruments through collaborative but only loosely coordinated efforts of many agents and agencies. Bankers on the ground issued "no-documentation" mortgages, the investment bank "quants" put them together into "trenches," the credit rating agencies blessed the low estimates of risk that were assigned to them, insurance companies and others provided default insurance, and sales agents peddled them all over the globe as profitable and risk-free opportunities. Few of the people involved were aware of all the mistaken assumptions baked into those products, and the complexity of their creation meant it was hard to hold anyone responsible for the disaster. Overoptimism, willing suspension of disbelief, and simply averting one's eyes from potential dangers are often hard to distinguish from intentional deceit.

The same general themes can be discerned in Britain of the 1860s, but of course in much more primitive form. But it was much more sophisticated than what had been seen before.

⁸⁹ This already gave rise to substantial controversy, as it involved a conflict of interest, since the contractor as contractor was interested in maximizing the price of the work, while as a shareholder should have been minimizing it.

⁹⁰ Testimony of Richard Stephens, Secretary of the Tewkesbury and Malvern Railway, in Appendix to United Kingdom (1864), *op. cit.* (note 69).

All the earlier investment manias appear to have been much simpler, not much beyond what is portrayed in the Glenmutchkin Railway story⁹¹. That a new era had come was noticed by contemporaries in the 1860s. A leader in *The Times* early in 1866, before the Overend, Gurney crisis, but at a time when many of the ingenious financial constructs were beginning to implode, declared that “[o]ne of the latest inventions of modern ingenuity is the Art of Finance”⁹². A year later, a retrospective piece noted⁹³:

The ingenuity of financiers, the ease with which debentures got taken through misapprehension of the true nature of their security, the facility with which, in unscrupulous hands, a system of depreciated issues and temporary loans unknown to shareholders gave fictitious values to the stocks brought out,—all these means helped to float more and more lines year after year, till at last there came a crisis ...

As with the GFC almost a century and a half later, it required the cooperation of many agents to create those “fictitious values,” a process that will be described in some detail in following sections.

There was widespread suspicion, augmented by the opacity of all accounting matters, about the financial instruments peddled by railways and their agents, such as contractors and finance houses. That is why interest rates were often high, securities were sold at discounts, and contractors being paid in shares or bonds demanded much higher prices for their work than if they were being paid in cash. There was substantial awareness of risk, and more than risk, uncertainty. However, there were still many naive investors to be enticed by promises of high profits from purchases of securities at discounts, which seemed to be providing temptingly high yields.

What kept the game going for a long time is that there was a large class of “greater fools” that market players could hope would either unwittingly or wittingly but unwillingly come to the rescue. Those were the established railways. Few of the many people supporting railway expansion in the 1860s wanted small independent railways, which would lack the economies of scale and the expertise to operate efficiently. The goal was to get the big lines to provide service, either by getting them to expand on their own, or by forcing them to take over new projects. (One could draw analogies to what happened during the dot-com mania or in very recent times, with various startups.) And it worked in a large number of cases. Thus the Chairman of the Great Western Railway, one of the largest and most prominent lines, told his shareholders in March 1866, so two months before the Overend, Gurney crash⁹⁴:

He was not going to hold out hopes of great prosperity in the future. ... The policy which ought to guide them in the future was totally to abstain from bringing upon

⁹¹ Aytoun, *op. cit.* (note 18).

⁹² *The Times*, 2 February 1866, p. 7.

⁹³ T. Hennell (1867) “Railway finance,” *Quarterly Review*, vol. 122, April 1867, pp. 489–506. Available online at (https://books.google.com/books?id=HUEpq_HaiwC).

⁹⁴ *The Times*, 5 March 1866, p. 6. This Chairman was Daniel Gooch, MP, the famous engineer and corporate manager, later to be Sir Daniel. It was undoubtedly easier for him to say this than it would have been for many other railway chairmen, since he was only installed as Chairman of the Great Western a few months before, with the specific mission of saving that line from what looked like impending ruin.

themselves those heavy obligations to which, unfortunately, they had been too much accustomed. They had in too many instances bought off opposition by taking over contractors' lines, many of which should never have been made, and which were not for the benefit of the country, but simply for the advantage of individuals.

Of course, those contractors' lines were made "for the advantage of individuals," but not "simply" for that reasons. This was a case of contractors, lawyers, "the roving cavaliers of credit," and others finding a way to profit from forcing lines like the Great Western to provide services there was demand for. The question is how many was "too many instances"? In addition to this testimony of the Chairman of the Great Western, we have examples, such as those presented later for the London, Brighton, and South Coast Railway, where this happened. But a major contribution of railway historians could be to elucidate the frequency with which promoters of new lines, as well as the contractors and purchasers of securities of those lines, did well because major railways bought those projects at high prices.

From "Old Corruption" to modern corporate capitalism

Trying to infer people's motivations is always difficult, and it is especially difficult when there are conscious attempts at obfuscation. That, unfortunately, applies all too frequently to the British railway industry in the 1860s. Minutes of the boards of directors, public presentations by chairmen, and press commentary are not to be trusted, even when they do cover a topic of interest. And, of course, only limited information has survived from that period. Hence we are left with situations such as a current historian's surmise that "[t]he Direct Portsmouth apparently always had in mind the desirability of selling itself to one of the large companies"⁹⁵. The most that investigator felt comfortable in saying was "apparently," although this surmise is very reasonable. It is unlikely that we will be able to obtain solid determinations of what led to various business moves, but even rough estimates would be useful.

The 19th century was one of rapidly changing technologies and business models, but also of moral standards and ranges of acceptable business behavior. The "Old Corruption" that dominated in the 18th century, where the focus was on obtaining pensions and sinecures from the government, faded away⁹⁶. In its place came Victorian morality, and also what was felt by many as new forms of corruption. Thus Herbert Spencer was likely influenced by his career in railway construction during the 1830s and 1840s to pronounce that⁹⁷:

there is the familiar fact that the corporate conscience is ever inferior to the individual conscience—that a body of men will commit as a joint act, that which every individual of them would shrink from did he feel personally responsible.

⁹⁵ J. H. Turner (1978) *The London Brighton and South Coast Railway: II. Establishment and Growth*, London, p. 79.

⁹⁶ Cf. P. Harling (1996) *The Waning of 'Old Corruption: The Politics of Economical Reform in Britain, 1779–1846*, Oxford.

⁹⁷ H. Spencer (1855) *Railway Morals and Railway Policy*, London. Available at (<https://books.google.com/books?id=.48aIQNqIuUC>). Earlier version published in *Edinburgh Review*, vol. 100, October 1854, pp. 420–461.

But it was not just corporations that were felt to have strayed from the path of righteousness. Those were certainly at the forefront, and in early 1868 *Bankers' Magazine* had withering comments about railway managers⁹⁸:

... the most disquieting symptom of the present era of disquietude, is the scarcely concealed delinquency of those in whose hands shareholders put their affairs. Concerning one great line after another, we have had a series of damaging disclosures, precluded by sinister rumours, which were emphatically and persistently denied, until denial was no longer possible. Now it was a vile conspiracy, and again, it was an absurd exaggeration. At one time it was a transparent fiction, and at another it was a totally unfounded rumour ; but in every instance the prophets of evil have had their predictions verified. The conspiracy has vindicated itself from the charge of vileness: the exaggeration has proved within the mark, the transparent fiction has turned out hard fact, the unfounded rumour has told less than the truth about the involvements of lines whenever once believed in. Of course there is no lack of expedients to hoodwink the public, and still less reluctance to employ even the most questionable of devices for staving off the evil day ; but the truth will out at some time: Nemesis will be avenged.

However, individuals and partnerships were not immune to the disease. A month later, that same periodical had an article about Peto, one of the greatest railway contractors of that age, who had to suspend payments in May 1866, a day after Overend, Gurney closed its doors, but did so with reassurances that this was just a temporary liquidity squeeze, with plenty of assets to make all creditors whole. Those reassurances turned out to be incorrect. His supposedly immense wealth had consisted largely of pious hopes for some years⁹⁹:

A glance over their accounts for December 31st, 1863, tells us that then, as now, they had an immense quantity of inconvertible stuff on their hands, which could only have been realised at a heavy sacrifice in those days, and which is now adversely affected by the depreciation from which every description of property has suffered from the events of the last few years. But the one great moral which is pointed by these balance sheets is the fallacy of financiering, as understood and practised by the modern school of contractors and their allies. Put into plain English, it means simply trading with capital which has no real existence, in the hope that by so trading, money may be obtained for making grand and perilous experiments with the capital of other people. It is a systematic incurring of actual liabilities to be met by potential profits, a scheme, or series of schemes, for discounting possibilities at any terms which the greed of the lenders may induce them to demand, or the need of the borrowers compel them to accept.

It was not just the great and mighty who were often discovered engaging in questionable practices. There were allegations (and some cases were proved in court cases) of bank

⁹⁸ "Railway securities and bankers' acceptances," *Bankers' Magazine*, January 1868, pp. 3–7.

⁹⁹ "Sir Morton Peto's balance-sheet," *Bankers' Magazine*, February 1868, pp. 73–6. Of course, there are widespread suspicions that many of the high asset valuations of 2020, as this is being written, are equally insubstantial.

agents being bribed to accept substandard securities¹⁰⁰. The financial press professed its devotion to investors' welfare, but was corrupt, and this included the most influential financial journalist of that period, Marmaduke Blake Sampson of *The Times*¹⁰¹.

There were also basic issues of incentives, what is today called the "principal-agent problem." There were frequent accusations by shareholders that boards of directors were under the thumb of engineers, lawyers, and contractors, who had an interest in spending more on branches and extensions¹⁰². The issue is complicated, though, because there were genuine differences of opinion about the potential values of those branches and extensions. Without tools such as gravity models, and without a shared sense for the growth rates that railway revenues might exhibit, it was hard to refute optimistic projections. As a matter of fact, predictions of demand for large transportation projects continue to be hard today, even with much better tools and data. Those who have studied the situation generally conclude that this is to a large extent due to natural optimism of promoters combined with the interest of politicians, labor groups, and contractors in building.

The rapid railway expansion during the railway mania was associated with, and enabled by, the proliferation of so-called independent lines. For example, one railway paper commented on the 328 petitions for railways bills that were submitted to Parliament for the 1864 session, and implied that the largest share was "by private projectors, in the hope that they will eventually be taken up by one of other of the adjoining companies in a position to compete for their possession"¹⁰³. That was regarded as the standard way to find a "greater fool" to purchase a railway scheme. Promoters might, for example, obtain Parliamentary sanction for a line from town A on line X to town B on line Y, and would then run an auction, asking lines X and Y to bid to buy them out. If line X purchased the line (after it was built, or, more frequently, after the Act was obtained but before any substantial sum was invested in construction), it could then use it to capture some of the traffic that line Y carried through B, and vice versa.

In many cases, proposed new rail projects were only ostensibly independent. Directors of established lines found it convenient to use legally separate entities to avoid some Parliamentary limits¹⁰⁴, or to pretend they were not encroaching on a neighbor's territory, or to conceal what they were doing from their own shareholders. (Some examples will be cited at the end, in connection with the London, Brighton, and South Coast Railway.) Thus establishing what the real motivation was for a particular project is often difficult, and a worthy subject for deeper investigation.

¹⁰⁰ Cf. Anonymous (1867) *The Financial Lessons of 1866*, London, citing that same author's letter in *Pall Mall Gazette*, 18 May 1866, p. 4.

¹⁰¹ See, for example, J. Taylor (2015) "Financial crises and the birth of the financial press, 1825–1880," pp. 203–14 in S. Schifferes and R. Roberts, eds., *The Media and Financial Crises: Comparative and Historical Perspectives*, Oxon.

¹⁰² One of the innumerable quotes to that effect is by Hackett in his annual statistical study in *Herapath's Railway Journal*, 5 January 1856, pp. 2–3. Another is in a letter in the same paper almost a decade later, 28 January 1865, pp. 83–84, which predicted that "[t]he old game will be played over again, in which lawyers, engineers, barristers, and Parliamentary agents hold the cards, which the unfortunate Shareholders provide the stakes."

¹⁰³ *Railway News*, 16 January 1864, p. 41.

¹⁰⁴ As is explained in "Independent railway extensions," *Herapath's Railway Journal*, 23 September 1865, pp. 1045–46.

What does seem unquestionable is that the proliferation of the truly or only ostensibly independent project was key to the expansion of the railway mania of the 1860s. The focus of this work is on the relaxed regulation and legal and financial innovation that made it convenient and inexpensive for those independent projects to arise. Those steps are considered in detail next.

Strict initial government scrutiny

At its start, railway legislation followed the pattern that had evolved for canals. It automatically offered limited liability to investors¹⁰⁵. Hence the intense debates in public and in Parliament on this topic were not directly relevant for Britain's main transportation industry, which is where practically all British domestic company investments went until well past the middle of the 19th century. Therefore the Companies Act of 1862 did not affect railway promotion directly. What it did do is stimulate the creation of finance and contractor companies that were key to the railway expansion that did take place.

Although the 19th century in Britain was dominated by doctrines of free trade and "laissez faire," government was tied inextricably to the construction and operations of railways. The general expectations in Parliament in the early years of railways was that once an Act sanctioning a line was passed, there would be no need for further legislative involvement. The general rules that applied to common carriers and the provisions of each railway's Act that imposed upper limits on charges were thought to be enough, as they had largely been enough in the case of canals. Those expectations turned out to be wildly incorrect for railways, though. Unlike canals, railways were constantly expanding, and impinged far more deeply on the economy and people's lives. So there was constant debate about railway policy, and railways were constantly coming to Parliament for permission to build new branches, enlarge their stations, and of course raise more funds, and so on.

Railway law was a substantial area with a large literature and many lawyers specializing in it. There were also regulations in Parliament, in the Standing Orders of the House of Commons and (separately, but generally closely parallel) of the House of Lords. However, in some of the most important aspects that involved railway finance, regulation was generally becoming relaxed as time went on, although there were occasional steps in the other direction. This created an opening for clever folks to use "financial engineering" to finance the huge expansion of the railway network in the 1860s in ways that concealed what was happening from investors and general observers, as well as from Parliament¹⁰⁶.

In the very early years of railways, there was a thorough scrutiny of each new project that came up for authorization. This scrutiny also ensured that railway projects were widely discussed, and their proceedings, financial and otherwise, were visible to the public.

¹⁰⁵ In common with almost all that has been published about British railways, only lines that went to Parliament to obtain the right of compulsory purchase of land are considered here. There were a few railways that were built by private contract involving landowners, and those are not considered here, and also are not included in any of the available official statistics. They did not have limited liability.

¹⁰⁶ There were some variations in the standard procedures early on. Many are covered by H. Pollins (1954) "The marketing of railway shares in the first half of the nineteenth century," *Economic History Review*, vol. 7, N.S., no. 2, pp. 230–39.

Promoters had to submit detailed plans, including those covering their business cases, and defend them in adversarial proceedings before four Parliamentary committees (two in the House of Commons, two in the House of Lords)¹⁰⁷. These business plans involved estimates of costs and revenues, and guarantees that capital for construction would be forthcoming.

Success in passing Parliamentary scrutiny did serve to provide some reassurance to investors that the project was pretty solid and likely to be profitable. For example, *Railway Record* in the fall of 1845 discussed the myriad projects that were being prepared for submission in the 1846 session. It opined that most would be discarded as insubstantial or outright fraudulent, but “[i]f they pass Parliament, they may be looked upon as profitable investments, seeing the points on which Parliament must be satisfied respecting them; ...”¹⁰⁸. Such support for the promoters’ promises of profitability was not the ultimate goal of the process, though. As was mentioned in the Introduction, Parliament was not interested in guaranteeing investors against losses. But it did want to ensure it was profitable enough to provide a valuable service.

A major part of Parliamentary scrutiny was testimony by people from a proposed line’s locality about its utility. Landowners, manufacturers, and traders would discuss how their or other businesses would gain from better railway communication. But “talk is cheap,” and speakers would not have to demonstrate their commitment to schemes being investigated. Thus, for example, Sir Charles Wood, MP, testified in favor of a line affecting the town he represented, but he “had never owned a railway share and had no intention of doing so now”¹⁰⁹.

There were three quantitative aspects of the economics of a project that were scrutinized by Parliament in the 1830s and 1840s, in ways specified not by legislation, but by Standing Orders:

- cost to build and operate the line
- revenues of the line
- availability of capital to build the line

Considerably more detailed discussion of the first two items in the list is available elsewhere¹¹⁰. Here let us just note that estimates of costs came from engineers. And railway engineers, just like other technologists before and since, to this day, have almost universally been too optimistic on costs (as well as on performance and time to completion). This was already known before railways appeared on the scene. But there was nothing that could be done about it, so engineers continued to provide their (faulty) cost projections. And that was what investors and Parliament had to rely on, although some allowance was usually made informally for cost overruns.

¹⁰⁷ By the late 1840s, this was whittled down to one committee for each house. The verification of compliance with Standing Orders was delegated to special officials.

¹⁰⁸ *Railway Record*, 19 November 1845, p. 1734.

¹⁰⁹ Cross-Rudkin, *op. cit.* (note 20) p. 139.

¹¹⁰ A. M. Odlyzko (2010a) “Collective hallucinations and inefficient markets: The British Railway Mania of the 1840s,” manuscript available at (<http://ssrn.com/abstract=1537338>); A. M. Odlyzko (2019a) “Dionysius Lardner, the denigrated sage of early railways,” pp. 39–58 in *Early Main Line Railways 2: Papers from the Second International Early Main Line Railways Conference*, M. Chrimes, ed., Croydon. Preprint available at (<https://ssrn.com/abstract=3445470>).

Estimates of revenues for a railway, once it was completed, were provided in the smaller mania of the 1830s and up through the 1845 Parliamentary session in the big Railway Mania by a small and short-lived group of professionals called the “traffic takers.” They used a systematic methodology, one that evolved through Parliamentary committee hearings, and was accepted by Parliament, that estimated revenues of a railway by extrapolating from the observed traffic on adjacent roads. What is most remarkable, the estimates they provided in the 1830s turned out to be, at least from the perspective of the Railway Mania in 1845, say, to be almost exact, far more accurate than modern demand estimates for large transportation projects typically are. That was the reason the railway mania of the 1830s was successful for original investors. Costs were about double those projected. However, revenues came in on target, and initial profit projections were extremely generous. Hence actual profits were lower than promised, but still very good¹¹¹. However, this accuracy was not appreciated during the Railway Mania. Instead, a myth became widespread, and persisted for decades, far beyond the railway mania of the 1860s, that “traffic had exceeded all expectations.” This perception came from some basic misunderstandings of railway economics that are discussed at the end. That helped to lead to the elimination of traffic takers and their estimates, starting with the 1846 Parliamentary session. Other reasons for this elimination were the overwhelming volume of proposals that had to be considered, and the opinion that investors by that time had enough experience to decide whether a project was going to be profitable without having to rely on the traffic takers¹¹².

Thus from 1846 on, there was no systematic method employed to estimate revenues. Parliamentary committees had to rely on rough guesses, and on the testimony of merchants and other observers about the expected benefits of a new project¹¹³. This also meant that opponents of new proposals (and there were many of those, in particular representatives of established lines) lacked quantitative arguments that could be used to demonstrate that those new proposals were not viable.

It is almost certain that the traffic taker methodology would not have provided reliable projections in the context of the projects of the 1860s, as it relied largely on projections from data about long-distance coach traffic, which were not relevant for the mostly short lines that were considered after 1850. However, as was mentioned earlier, and will be discussed later, gravity models could have been used in this context, but unfortunately they had been forgotten after their discovery by Desart in 1846.

The third item on the list involved subscription contracts. Today, when ordinary investors purchase shares, whether in new or established companies, they are not obliged to put in any additional money into that company, except for rare cases. In the 19th century, though, investors in new ventures would normally sign legally binding subscription contracts which would oblige them to first put down a deposit, on the order of 10% of the nominal value of each share. Then, as the company proceeded with its project, they would

¹¹¹ For details, see Odlyzko (2010a) and (2019a), *op. cit.* (note 110).

¹¹² It should be noted that the estimates provided by the traffic takers in the sessions of 1844 and 1845 turned out to be too high, which was an important contributor to the financial disaster of the Railway Mania. There seemed to be two main reasons for this failure. One was that the traffic takers modified their methodology, compared to the one they used in the 1830s. The other was that with a more dense network, competing lines were relying on the same road traffic for their estimates, leading to overcounting.

¹¹³ Such testimony was standard, and had been present even before the traffic takers came on the scene.

have to respond to “calls” from the management, asking for more funds for the works, up to the limit of each share¹¹⁴. Companies could sue shareholders who refused to pay the calls, or else seize their shares, but this was a cumbersome and unfriendly process, and one that could not go far when the shareholders simply had no money to pay. Parliament knew that investors’ “animal spirits” waxed and waned, and desired to obtain assurance that shareholders would respond to the calls from directors so that construction could be completed. Hence it looked for proof that no extreme measures such as lawsuits or forfeitures would be required.

The standard procedure was for the promoters to obtain estimates of costs of acquiring land and building their line, and ask Parliament for permission to raise equity capital for that amount, which was supposed to incorporate a 10% additional amount to cover “contingencies.” If this came to £600,000, say, they would also ask for permission to borrow in addition one third of that, or £200,000, “just in case,” but this borrowing could only start after at least half of the equity capital had been raised¹¹⁵. It appears that all knowledgeable participants, including in particular the promoters, engineers, MPs, and the railway press, understood this was a polite fiction, that there would be cost overruns, and the borrowing powers would have to be exercised. (Almost universally, even the combination of share and loan capital sanctioned by a railway Act was insufficient, and this forced an application to Parliament for a supplementary Act to authorize raising additional funds, which was almost invariably granted.) But this may not have been understood by too many investors, as promoters would sometimes tell them that instead of raising all the equity called for in the estimate, some would be replaced by loans, so share investors would have their capital leveraged and thereby obtain higher profits. In any case, there seemed to be a tacit conspiracy to accept this polite fiction, and that is how railway promotion proceeded.

To ensure that a project had solid funding, Parliament required that when promoters submitted their projects for approval, they had to provide subscription contracts covering at least 75% of the equity capital, and deposit 10% of that 75% with a government agent¹¹⁶. The subscription contracts were scrutinized by Parliamentary committees, and especially by opponents. The expectation was that the money would come from those who subscribed for shares, and, if a project was approved, would be used for construction, with the subscribers putting up the rest of the funds as works proceeded. Lists of subscribers were prepared, giving their positions in society, distinguishing those who who subscribed for at least £2,000, and those who were local to the vicinity of the line. (Such people were expected to have more of a stake in the enterprise, and also to know more about its real utility. Thus their participation was thought to provide additional assurance the project was a worthwhile one.) While discussion of the validity of subscription contracts occupied a lot of the time of Parliamentary committees, this seldom had much of an effect on approvals. Opponents could only raise questions about a few of the purported investors, and since some mistakes were unavoidable, and it was hard to estimate the affluence of individuals in days when there were no credit bureaus, it was very hard to reject a project on the

¹¹⁴ This is still how the process works today for large investors in venture capital or private equity funds.

¹¹⁵ Loans at one third of equity capital was the general rule for a long time, dating to the canal era, and it was codified as a default in the 1845 railway legislation.

¹¹⁶ There were some brief periods when the 10% was departed from.

basis of a few questionable entries in the contract. In fact, subscription contracts were often full of what were called “men of straw,” namely subscribers who had no means of providing the full amount their share allotments called for. This was typically accepted tacitly by the promoters, or even arranged by them. There were also secret side deals, in which promoters would assure some particularly desirable subscribers they would not be asked for actual money for their shares. That this was happening was known to many of those seriously involved in the railway industry, although nobody had any quantitative estimates of the extent of such practices¹¹⁷. Still, the Standing Orders requirements for subscription contracts did impose some barriers on promoters, as they had to go to substantial efforts to prepare lists that looked at least moderately plausible. The Glenmutchkin Railway story covers that part well, although in a satirical vein. This requirement was eliminated in 1858, though.

What happened in 1858 was that each house of Parliament set up a committee to streamline their procedures for dealing with private bills. Both committees considered railway subscription contracts, and both recommended they be abolished, and that sole reliance for assurance of the serious nature of a project be placed on the deposit, which was boosted to 8% of approved equity capital from the former 7.5%. Neither committee devoted too much attention to the issue, just a couple of pages out of over 300 total in both reports¹¹⁸. In each case there were two witnesses who were questioned on this topic¹¹⁹. They characterized the subscription contract as “mere mockery,” “mere delusion,” and “to a very great extent fictitious.” On the other hand, they did support the deposit, and, for example, one of them stated that he “believe[d] that deposit is a far better thing, and is a sufficient guarantee for the execution of the work”¹²⁰. The recommendations of the committees and the resulting revisions of Standing Orders were consistent with these opinions.

It is hard to tell whether the experts testifying about subscription contracts were disingenuous or oblivious. But it is clear that the members of the committees who listened to them were either careless, or were willing to engage in what is sometimes called “willing suspension of disbelief.” The reason is that what the witnesses said about subscription contracts raised very obvious questions about the deposits, whether they were not also a “mere delusion.” For example, testimony was offered that when an established railway asked to build an extension, its directors would sign the contract, each for an equal share of the capital. But it was obvious that in almost all cases directors did not have that much money of their own. They were signing on behalf of their line, which was the guarantor of funding. But the line, in almost all case, had no money to put up either, because of

¹¹⁷ Various concrete examples were cited in the press, for example in the leader “Dragon’s teeth—Petonia in the East,” in *Railway Times*, 20 January 1857, pp. 43–44.

¹¹⁸ United Kingdom (1858a) *Select Committee of House of Lords to Inquire Into System of Proceedings in Parliament on Private Bills, Report, Proceedings, Minutes of Evidence, Index*, Parliamentary Papers 1857-58 (450) (450-1) XII.15, 173; United Kingdom (1858b) *Select Committee to Inquire Into Parliamentary Expenses in Reference to Railway and Canal Legislation. Report, Proceedings, Minutes of Evidence, Appendix, Index*, Parliamentary Papers 1857-58 (411) XIV.1.

¹¹⁹ However, there were just three persons involved, as one person testified before both committees. That person was Thomas Coates, the Parliamentary agent who had a strong interest in maximizing the number of schemes submitted to Parliament, and who, a few years later, would go on to pen the strident defence of contractors’ lines that was noted before, Coates, *op. cit.* (note 82)

¹²⁰ United Kingdom (1858a), *op. cit.* (note 118), Q. 840.

its financial limitations, to be discussed in the next section. So the money for the deposit had to come from some other source, and was somehow borrowed from people or institutions that were not subscribing investors. Yet none of the members of the two committees pursued such a line of questioning.

It is easy to believe that committee members were engaged in a willing suspension of disbelief. After all, that is what they did by accepting engineers' estimates. And there were plenty of other instances where laws and regulations were stretched, and even outright violated, yet such transgressions were tolerated. For example, in the 1830s and 1840s, when there was still extensive opposition to construction of railways, surveyors would often encounter landowners who would not permit them to enter their land, which was essential for the preparation of the detailed plans that had to be submitted to the government. Such surveyors in those cases simply trespassed. They often relied on subterfuges, and sometimes engaged in physical fights with the landowners' servants. Parliament tolerated such transparently illegal activities, and refused to give surveyors the right to invade private property. Other instances will be noted in the next section. An interesting case involving a subscription contract came up shortly before the two committees discussed above were set up. Hearings before a House of Lords committee on a proposed new railway uncovered some hidden side agreements. This led to a rejection of the project, and strong condemnation by some outside observers as well as by some peers. The apologists claimed, on the other hand, that this was just a small technical violation of the rules. A railway paper wrote of the arguments of that project's lawyer before the House of Lords that he "endeavoured to show that all contracts were shams, and therefore that the one under discussion was not greatly worse than others"¹²¹.

In any case, subscription contracts were eliminated after 1858. This did give rise to some concerns even before the mania of the 1860s became noticeable. For example, after the recommendations were released, a railway paper wrote somewhat sarcastically that "[s]ubscription contracts (those expensive and troublesome obstructions to contractors and other promoters of adventurous disposition) are to be abolished"¹²². And at the start of 1859, *The Times* published a letter by a reader alarmed by the flood of new projects that had applied for Parliamentary sanction, as "the dictates of common sense and prudence are alike abandoned"¹²³. This reader (and, as witnessed by the publication of the letter, likely also the editorial staff of *The Times*, that uniquely influential press organ, the most influential in the world at that time) warned of a disaster, and blamed it largely on the "important and fatal alteration" in the Standing Orders that abolished subscription contracts. So we can say that there were some observers who thought that having to present a plausible-looking list of subscribers had acted as a brake on the more visionary railway schemes, and that this brake was now gone.

What remained to constrain "promoters of adventurous disposition" were the 8% deposits. But some clever legal engineering soon eliminated even that obstruction.

¹²¹ *Railway Times*, 26 June 1858, pp. 800–801.

¹²² *Railway Times*, 31 July 1858, pp. 918–919.

¹²³ *The Times*, 6 January 1859, p. 5, letter entitled "Railway competition."

Evasion of government regulation

The intention of Parliament was always that the deposits should come from what were universally called *bona fide* investors, ones who were able and willing to pay down the deposit on application and then, as construction proceeded, the remainder of the par value of their shares. However, it was an open secret among the more knowledgeable observers of the railway industry that the funds for the deposits were frequently borrowed from banks, insurance companies, or individuals, none of whom were interested in becoming long-term equity investors. This was also a clear implication of the testimony before the two committees of 1858 cited in the previous section.

Deposits were made with Accountant-General of the Court of Chancery, the safest place one could imagine. However, promoters had to search for lenders and pay high interest rates, since the money was borrowed by the promoters of the railway project, and deposited in their names. Thus it was at risk, in case the promoters were to run into difficulties. The problem was solved in 1861 by Robert Baxter, of the legal firm of Baxter, Rose & Norton that is cited in the Cross-Rudkin paper on contractors' lines¹²⁴ for its prominent role in railway promotions¹²⁵. He decided that the way the Standing Orders were written, the deposit did not have to be made to the account of the promoters, but could be made by any persons or institutions in their own names. What seems even more remarkable than this piece of legal inventiveness is that "the clerks of the [Parliamentary office responsible for administering Standing Orders], acting on their own responsibility, acceded" to his interpretation¹²⁶. MPs only learned of the change by accident, in 1864. There were calls to rectify the situation, but nothing was done¹²⁷.

Baxter's ingenuity meant that promoters were relieved of most of their financial burden. This enabled small entrepreneurial groups to concoct independent lines. Practically any new project encountered fierce opposition from established railways that were potentially threatened by it. That posed a major hurdle. In the words of one observer, "[t]he risks and uncertainties of a Parliamentary contest are so great that no capitalists ever do or will come forward with money to make a line the Bill for which is not passed"¹²⁸. So some local promoters would get together a small fund, bring in an engineer to prepare a plan for the line, collect endorsements from locally eminent people, borrow the money for the deposit

¹²⁴ Cross-Rudkin, *op. cit.* (note 20).

¹²⁵ However, Thomas Coates, a Parliamentary agent cited earlier, claimed he had thought up the approach first, and suggested it to Baxter: Cf. T. Coates (1864) *Railway Deposits Discussed in a Letter to the Chairman of the Committee*, London. Available online at (<https://books.google.com/books?id=p6RVAAAAcAAJ>).

¹²⁶ United Kingdom (1864a) *Report from the Select Committee on Standing Orders (Parliamentary Deposits)*, Parliamentary Papers 1864 (423) X.613, p. iv.

¹²⁷ There were some interesting additional legal technicalities that are not discussed here, as they had only a minor impact on railway financing, but they do illustrate the complexity of navigating Parliamentary restrictions, and the reason lawyers and Parliamentary agents did so well out of railway business. One a railway bill advanced far enough in Parliament, to something called the "third reading," the deposit could not be withdrawn easily, so new lenders had to be found. Also, one lawyer apparently tried to bring a sense of caution by pointing out that under some conditions, part of the deposit might be taken to pay the legal costs of the opposing side, but this resulted in another lawyer claiming this could only happen in very unusual circumstances, and could be entirely avoided by making the deposit in the form of a particular financial instruments. This was in letters published in the "Money Market" financial column of *The Times*, 20 and 22 December 1865, p. 7 in both cases.

¹²⁸ Letter entitled "Private Bill legislation," *The Times*, 22 May 1866, p. 6.

from a bank or an insurance company, and go through the Parliamentary contest. If they lost, they would repay the loan, and suffer the loss of their investment, typically just a couple of thousand pounds. But if they won, they would either bring in larger capitalists, or effectively sell the Act to them, or else sell to one of the neighboring lines. This led to a proliferation of independent schemes being submitted to Parliament.

Baxter's innovation was likely accepted because it was just an extreme example of many evasions of the law that were practiced and tolerated. Railway promoters, managers, investors, and other observers often complained about what they claimed was capricious, illogical, inconsistent, and inefficient legislation emanating from Parliament. When they either broke the law, or evaded it, they often claimed (as was the case with the deposit issue discussed in the previous section) that theirs were just minor technical infractions. In the case of limits on borrowing powers, for example, they claimed that it was not possible to operate within them. Railways, or projected railway projects, basically had just one chance each year to apply to Parliament for new limits. But the need for additional funding often arrived at unexpected times.

There were also problems with rolling over maturing debt. As is visible in Table 1, up until 1870, most of railway debt was in the form of debenture bonds. These were loans taken from individuals or institutions for a fixed period, typically 3, 5, or 7 years. Their maturity dates were spread all over the calendar, although it appears they did concentrate at year-end and mid-year. They were for variable amounts, and although they could be sold, they were a rather illiquid instrument. The big problem was that if a holder of one of those bonds decided against rolling it over, the railway had to find the cash to pay the face amount on maturity date. To do that it had to issue another bond, and do it before the maturing one had to be paid off. That would force it to breach Parliamentary limits on total indebtedness. Eventually, spurred by the financial crash of 1867, railways did what some observers had been advocating for some time, namely move away from the medium-term debenture bonds towards the long-term debenture stock, as is visible in Table 1. But in the meantime, it seems that most of them did borrow illegally for short periods just before the middle and end of each year, in order to handle those bond refinancings.

Sometimes railways borrowed illegally for long periods. In the late 1830s and early 1840s, faced with never-ending cost overruns, railways starting issuing what were called "loan notes." These were basically unsecured loans. They were an open secret, as they were written about in the press, and were sometimes quoted in listings of financial instrument prices. But they went against the intent of Parliament, and were explicitly outlawed in 1844, in Gladstone's famous "An Act to Attach Certain Conditions to the Construction of Future Railways, 1844" 7 & 8 Vic. c. 85, s. 19¹²⁹.

Gladstone's 1844 Act did constrain railway borrowings, but legal and financial ingenuity managed to overcome that barrier. Some time around 1860, just in time for the railway mania of the 1860s, John Horatio Lloyd (1798–1884), an eminent member of the English bar, came up with a solution. His obituary in the most prestigious engineering publication

¹²⁹ This Act did retroactively sanction the loan notes that had been issued earlier. It was claimed that the blatant illegality of loan notes was one of the arguments that Gladstone used to persuade the railway interest to accept his Act, which was very controversial, as it made provisions for the inexpensive "Parliamentary trains," for example, and also for a potential nationalization of the industry.

of that era was unusually long, especially for someone who was not an engineer¹³⁰. It lauded his many accomplishments, without having to explicitly say that those accomplishments created many jobs for engineers:

It was by his advice that the means were found to establish a new company for laying the Atlantic cable, when the promoters seemed to have come to a dead-lock; and in the same way he devised the well-known security called “Lloyd’s Bonds,” without which a large proportion of the existing railways could not have been constructed. It was looked upon with suspicion by lawyers at first, as an evasion of the law. It was, however, too simple and too equitable to be set aside, and is now generally adopted.

Shareholders and their advocates often had different views. Thus, for example, a railway paper claimed, almost a year before the Overend, Gurney crash of 1866 (which led to even more jaundiced views) that¹³¹:

No man could incur more indebtedness in the way of gratitude on the part of railway speculators than has the acute originator of Lloyd’s bonds. ... A kind friend to promoters in distress has been Mr. John Horatio Lloyd. He was employed by one company to devise a plan by which they might honestly get out of their difficulties, and the learned gentleman framed for these clients, and for these only, a bond in shape and form which met all the requirements of the law even while it deceived the lender and mortgaged the *bona fide* shareholder. [The measure was then imitated by other lines.] ...

When the West Hartlepool investment disaster led Parliament in 1864 to inquire into ways that the intentions of their laws were evaded, Lloyd testified before a committee of the House of Lords and defended his creation as an important financial tool¹³². He claimed it was designed for a simple purpose, and that while “it has been applied to other purposes, which were not originally contemplated, cannot now be doubted,” its effects were almost uniformly positive in his view.

What was a Lloyd’s bond? It was a properly certified promise by a railway to pay, but not for a cash loan, which would have violated Gladstone’s 1844 Act, but rather for specific goods or services¹³³. Since railways had to pay for a profusion of goods and services, especially while under construction, this gave railway managers a means of spending essentially unlimited sums, with essentially no oversight. And, in many cases, they only pretended to pay for specific goods and services, and basically took a cash loan, making it the now clearly illegal “loan note.”

¹³⁰ *Minutes of Proceedings of the Institution of Civil Engineers*, vol. 78, 1883–1884, pp. 450–454.

¹³¹ *Railway Times*, 12 August 1865, pp. 1038–1039, leader entitled “Lloyd’s bonds.” A post-crash comment, in a letter to the financial column of *The Times*, 21 March 1867, p. 7, was less light-hearted, and suggested that holders of Lloyd’s bonds who had difficulty collecting on them should ask for “the advice of the very able gentleman whose name the bonds bear.”

¹³² United Kingdom (1864) *Select Committee of House of Lords on Railway Companies’ Borrowing Powers*, Parliamentary Papers 1864 (518) XI.43.

¹³³ Paying slight obeisance to Gladstone’s Act, Lloyd drafted the model contract to make his bonds not be freely negotiable, but only payable to the contractor. But the contractor could and often did sell those bonds, which meant that eventual buyer, in case of difficulty of collecting, had extra complications and risks.

One can find some mentions of Lloyd's bonds in the press in 1861, but they do not seem to have attracted much scrutiny initially. But then, as they proliferated, the level of concern grew. There were two issues that bothered observers. One was whether these new financial instruments were legal. If not, their holders might find themselves with worthless pieces of paper, and/or railways would have to scramble to find ways to repay the money. The other concern was about railway directors being able to bypass the scrutiny not just of Parliament, but of their own investors. At the end of 1862, one of the two prominent railway papers published a leader that drew on a letter from a reader, warning of the dangers of Lloyd's bonds. That paper noted that "a graver subject for the consideration of railway Shareholders and the public can hardly be conceived"¹³⁴.

Two weeks later this same paper published a letter, from another reader, that elaborated on how Lloyd's bonds were used to mislead investors, and posed dangers to investors and the economy as a whole¹³⁵. It was extraordinarily perceptive in terms of understanding how the various players and institutions interacted, and where dangers might lie. So it is worth quoting at length:

A knot of landowners, lawyers, engineers, and contractors, find themselves in possession of an act of Parliament for a railway, but without a Proprietary to give effect to it. Bound by the public, the enterprising contractors, at their own price, and for the immediate bonds of the Company, undertake to construct the line. These bonds they deposit with a joint-stock bank, anxious for business, and on them obtain advances within a certain margin. What they have to receive for their contract being perhaps about double the usual price, the contractors are thus not only placed in funds, but they put into their pockets, in hard cash, a large percentage from the outset. More than 50 per cent. of the capital being thus immediately created by bonds, and advanced on by the bank, the Company is now in a position to borrow on debentures, which are of course handed to the contractors, and by them paid into the bank as cover for further advances, and thus affairs proceed until the bank has come under advance on the full amount of capital and debentures which the Company is authorised to issue. Hitherto things have gone on smoothly. The Company has seen its line progressing, the bank has got, in some instances, as much as 6 per cent. on its advances, which the contractors have received their reward. But the discovery is now made that all the money powers are exhausted, and the line but half made. An act of Parliament, preference shares, and further debentures are the result, and the bank being now committed, and having no alternative, repeats the process of advancing. In this way it has been calculated more than the paid up capitals of any six joint stock banks in the kingdom have been absorbed.

As the capital and deposits of most joint stock banks would be inadequate to such advances, repledging with other banks becomes necessary. For the latter this may be a safe operation, as they have the Proprietors of the former to fall back on. Should

¹³⁴ *Herapath's Railway Journal*, 6 December 1862, p. 1262.

¹³⁵ *Herapath's Railway Journal*, 20 December 1862, p. 1304, letter entitled "Railways, contractors, and joint stock banks."

the line when open be a success, well, but if otherwise, pecuniary fear being of all contagions the most catching, what a prospect looks in the face of the Proprietors.

A few explanatory comments are useful. The bonds mentioned in the third sentence were both debenture and Lloyd's bonds. The very first sentence quoted above cites a group of interested persons who "find themselves in possession of an act of Parliament for a railway." This could mean that they themselves obtained that act, or else that they bought out some folks who, by the process simplified by Robert Baxter's invention discussed in the previous section, had obtained such an act, but were not themselves in a position to carry it out, as they did not have the right connections. Obtaining funds from banks was the most likely way to proceed when the letter was written in 1862. However, as the mania blossomed and gave rise to the various finance companies, and also tempted older establishments such as Overend, Gurney into novel forms of what was called "financiering," those institutions played a much larger role than banks. Finally, the reference at the end of the letter to how a provider of funds to the primary lender may be engaging in "a safe operation, as they have the Proprietors of the former to fall back on," refers to the fact that shareholders in many of the new limited liability companies were actually facing almost unlimited liability. As was mentioned early in the section on the general investment mania of the 1860s, it was typical to have shares of large denominations, with only a small fraction of the share called up. So an investor who bought a £100 share with £10 called up, paying, say, £20 for it, was liable, when the concern imploded, for another £90 on that share. This was one of the big traps that financial engineering in the mania of the 1860s created and that investors often fell into.

The letter cited above shows that there were some observers who understood very clearly the dangers of the combination of deregulation, opacity, and financial innovation. However, there do not seem to have been very many of them, and none appear to have presented any quantitative estimates of how big and dangerous the problems were. Lloyd's bonds continued proliferating, and there did not seem to be too much concern about them for about a year.

The second issue of the new railway paper, *Railway News*, had an article about Lloyd's bonds¹³⁶. It opined that those were likely illegal, and posed a danger for investors:

If these bonds be good in point of law, railway directors would appear to hold in their hands the power of creating almost unlimited capital. It would even be possible for them, besides creating and issuing all their share capital and all their loan capital, to defray the whole cost of making and stocking their lines by means of these bonds ... It need scarcely be added that such could never have been the intention of Parliament.

That article might not have had much effect by itself. However, a few days later this piece was reprinted by *The Times*, by far the most influential newspaper in the world at that time. That led to letters of rebuttal in the next two issues of that paper, complaining about false alarms being raised, pointing out that Lloyd's bonds had been recognized as legal by a court some time before, and claiming that they were an innocuous measure that allowed railway managers to temporarily bypass the unnecessarily rigid restrictions of standard

¹³⁶ "Lloyd's bonds," *Railway News*, 9 Jan. 1864, p. 33.

bonds¹³⁷. Two weeks later, though, another letter was published by *The Times* which pointed out that Lloyd's bonds were not the only way the financial picture of new railway projects was being distorted, and the underlying economic reality was being hidden from both Parliament and the companies' own investors¹³⁸. The writer mentioned that what seemed a small change in the law that had seemed innocuous was being exploited by railway promoters. Instead of paying for land in cash before the start of construction, as used to be the standard operating procedure, they were now able to promise landowners annual rent payments on completion of the project. That made the apparent cost of the line lower, but at the expense of cutting into eventual profits. The writer of the letter noted that this would have a major impact on railways, especially in urban areas with high land acquisition costs, where "[v]ast, indeed, must be the net earnings of a company which will bear successfully such a weight of incumbrances, and yet leave a dividend for preference and ordinary shareholders."

Thus there was considerable information available to the general investing public about the distortions being introduced into railway finance by the novel measures and instruments. This body of information grew when the House of Lords set up a committee to look into railway borrowings. Its report, in the words of *Herapath's Railway Journal*, was "short but valuable," and showed that "[t]he Committee are against Lloyd's Bonds, and well they may be"¹³⁹. *The Times* used the appearance of that report to publish a leader that explained what Lloyd's bonds were, and discussed their dangers¹⁴⁰. Its essence can be summarized by a statement it contained, that "[a] Lloyd's Bond is briefly an ingenious implement by which a railway can be made for nothing."

There were calls for Parliament to curb the issuance of these instruments, but nothing was done. It appears that the consensus was that they were not sufficiently big and dangerous to worry about. Proponents of Lloyd's bonds argued they were just temporary debts that were going to be replaced by conventional bonds soon. At the end of 1864, *The Times* noted sarcastically in a leader that¹⁴¹

Parliament, having interfered to prevent these Companies from borrowing, as it would seem they might well be permitted to do, to the extent of their credit, employs itself in passing Bills for the issuing of stock or debentures in order to pay off loans contracted in defiance of its own prohibition, thus helping those who have got into a difficulty by eluding the rules which Parliament itself has laid down.

But there was no sign of concern that Lloyd's bonds would lead to a disaster. In fact, the leader in *The Times* cited above was basically saying that Parliament should loosen the

¹³⁷ The reprint of the *Railway News* piece was in the financial ("money market") column of *The Times*, 13 Jan. 1864, p. 7, and the two letters in issues of 14 Jan., p. 7, and 15 Jan., p. 6. Apparently the most important of the decisions upholding the legitimacy of Lloyd's bonds came later that year, in the case of *Chambers v. The Manchester and Milford Railway Company*, *The Times*, 23 June 1864, p. 12. This, as well as prior decisions, only allowed for use of these bonds to pay contractors.

¹³⁸ *The Times*, 29 Jan. 1864, p. 7.

¹³⁹ *Herapath's Railway Journal*, 23 July 1864, p. 848, with the report itself, but not the minutes of evidence, on p. 840. Those minutes are in *United Kingdom (1864) op. cit.* (note 132).

¹⁴⁰ *The Times*, 21 July 1864, p. 10.

¹⁴¹ *The Times*, 27 Dec. 1864, p. 6.

restrictions on railway borrowing, so they would not have to engage in such questionable procedures as Lloyd's bonds¹⁴².

In the end, all contemporary observers agreed that Lloyd's bonds were a major contributor to the general investment disaster of the mania of the 1860s, and to the Overend, Gurney climactic crash in May 1866 in particular. There is a lack of information on their volume, and what we find in the contemporary literature are mostly statements they are important, but their volume is unknown. As was mentioned before, there are no trustworthy estimates, but the known ones range up to £30 million¹⁴³.

Lloyd's bonds were admitted to be an evasion of Parliamentary restrictions, but they were held to be legal. Another financial innovation of that period was held to be illegal, and some observers claimed a judicial decision to that effect in May 1866 helped precipitate the Overend, Gurney crash just a couple of days later.

This innovation consisted of having railways use a particular financial instrument, the bill of exchange. This was a standard security with roots in the Middle Ages, and it was crucial for the operations of the British economy in the 18th and 19th centuries. It was basically a short-term loan, an IOUs that was tradeable, and discount houses such as Overend, Gurney existed primarily to purchase such bills, and thereby finance trade. When the bill came due, typically 60 or 90 days after issue, the then-holder would ask the issuer to pay up. There was nothing illegitimate about them in principle, although they could be abused, and were abused, especially at peaks of the business cycle. Railway contractors used them heavily, and did abuse them¹⁴⁴. However, they were supposed to be used only by ordinary commercial firms. The Mid-Wales Railway, which had a very colorful and troubled history, issued some bills of exchange to raise money for its operations. When this company was asked to pay on those bills, it refused. It argued that charters of railways did not permit them to use bills of exchange, so the ones it had issued were illegal, and did not have to be paid. Overend, Gurney and another discount house took the issue to court. After a preliminary ruling in favor of the Mid-Wales Railway, an appeals court unanimously confirmed that decision just a couple of days before the Overend, Gurney crisis.

Henry Dunning Macleod, a prominent economist and a leader in the study of credit and money, published a new edition of one of his books right after the crisis, and he managed to insert into that work some coverage of the panic. Macleod claimed that it was the court decision that was "the event which it is probable produced the great panic"¹⁴⁵. But that

¹⁴² That leader was very interesting, it that it claimed that the new lines "whether they benefit the shareholders or no, are sure to benefit the public." Hence it supported a policy of sanctioning such projects, as localities were desperate to build them, "if they would not be altogether distanced and passed by in the race of improvement." There was no concern that the financial losses would be shifted unto some unsuspecting investors who might not even be aware of the particular project they got involved in by lending money to a finance house, say. Not entirely dissimilar to the securitizations we saw in the early 2000s.

¹⁴³ *The Times*, 23 June 1864, p. 12.

¹⁴⁴ See Cottrell, *op. cit.* (note 20), for much detailed information. A deficiency of that paper is in its very light coverage of the role of Lloyd's bonds, as well as regular debentures, ordinary shares, and preference shares issued by railways as backing for the bills of exchange issued by contractors.

¹⁴⁵ H. D. Macleod (1866) *The Theory and Practice of Banking*, 2nd ed., London, vol. 2, p. 158. The Preface to this volume is dated 20 June 1866, and is separate from that for the 1st volume, as it incorporates observations on the panic of the preceding month. Macleod incorrectly claimed the court decision was issued on Wednesday, 9 May, the day before Overend, Gurney closed its doors. Instead, the Mid-Wales Railway decision was actually

seems very doubtful. Other contemporary observers mentioned that court decision only in passing, if at all. It was an appeals court decision, too, and reaffirmed the decision of the lower court, so was likely anticipated by the markets. But it may have been one of the “straws that broke the camel’s back.” It was the general opinion that there were railway bills of exchange of total value in the millions of pound sterling, whose validity was now questioned. However, nobody knew how many there were, nor what institutions held them. There was also the question of which ones would be paid. (Laws were one thing, but there were also accepted business practices, and the repudiation by the Mid-Wales Railway of an obligation it had freely taken on was regarded as dishonorable.) These uncertainties likely contributed to the growing unease, and helped stimulate the run on Overend, Gurney that led to its closure.

There were other legal issues that contributed to investors’ unease at that time. Before 1860, railway bankruptcy was an exceedingly rare event, so bond investors did not have to worry much about what might happen in bankruptcy. Who among the creditors would be first in line? Would holders of Lloyd’s bonds have precedence over those who bought debenture bonds? What could creditors do to an insolvent railway? Some people thought it was clear from Parliamentary acts that holders of railway debentures could not seize any assets, all they had was a superior claim on the cash flow that was left after payment of operating expenses. But some had hopes it might be otherwise, and it took some judicial decisions to disabuse them of that notion. But could they force railway companies to sell their surplus lands, for example? That was not so clear, but courts decided creditors could not do that. Overall, though, uncertainty about precise legal status of various stakeholders contributed to the uncertainty that magnified the panic.

Extreme examples of railway finance of the 1860s

Previous sections described some of the most creative financial measures that involved the railway industry. What is still lacking are estimates of how often and to what extent they were used. That is one deficiency that railway historians might be able to remedy.

This section presents some interesting, even if somewhat extreme examples of how some of those measures worked in practice. Comparing British GDPs of the 1860s with those of 2020, £1 million then can be thought of as similar to £2 billion today. So the examples below, each of which involves what were regarded at that time as scandalous misapplications of sums on the order of £1 million, were not negligible. Recall that Crossrail, the large new London area underground system, cost around £20 billion, which by this measure is comparable to £10 million in the 1860s. That is not much more than the waste involved in the epic London, Chatham, and Dover Railway investment disaster of that period, which we do not discuss in detail.

One illustrative example from the 1860s is that of the Cork and Youghal Railway. It involved one of the many colorful characters of that era, David Leopold Lewis. Unfortunately

rendered on 8 May. More information about this case is in *Railway Times* of 27 February 1866, p. 195; 3 March, p. 254; and 12 May, pp. 571–572. Other coverage in *The Times*, 15 February, p. 11; 1 March, p. 11; and 10 May, p. 7.

there does not seem to be any biography of him. Lewis appears to have been involved in a number of cases before London courts in the 1850s, and went through bankruptcy in 1855. During the 1860s, he came to effectively control the Cork and Youghal Railway, a 27-mile line in Ireland. He declared bankruptcy again in 1865, with liabilities of about £850 thousand. This prompted *The Times* to wonder how the many respected London financial figures (including those running Overend, Gurney) could have trusted him with so much money so soon after his original bankruptcy¹⁴⁶. A year later, a House of Lords investigation into that railway showed that it had issued the full £500 thousand in shares and debentures authorized by its Act, and then an additional £426 thousand, with over 90% of that in Lloyd's bonds, that were handled by Lewis. Some of those bonds were issued to Lewis ostensibly to replace older ones, but apparently he did not replace anything, and simply placed the new ones in circulation. The House of Lords committee "have been unable to ascertain how much money has ever been received by the Company from the putting in circulation the Lloyd's Bonds which were negotiated by Mr. Lewis with various finance companies"¹⁴⁷. That committee also noted "that these Bonds do not appear to have been given, with one trifling exception, directly to contractors and others in payment for work done, but to Mr. Lewis to raise money upon them as he best could, for the purpose of the directors." Thus those bonds were not legal under the law as interpreted by the courts.

We do not know how much real cash was raised on behalf of the Cork and Youghal Railway, nor where it went. Lewis was engaged in various other projects, as well as a purchase of at least one fancy estate, and some public works. But at least on paper, from the perspective of shareholders, the line appeared to be have cost £926 thousand. It was taken over in 1866 by the Great Southern and Western Railway for £310 thousand, which may not have been much less than it would have cost to build that line properly¹⁴⁸. So it would seem that the nominal cost of this line of £926 thousand was two or three times what it should have been.

The Times in the coverage of the Cork and Youghal Railway that was cited above noted that this line's "issue of Lloyd's bonds ... seems moderate in comparison with that of the Carmarthen and Cardigan Railway," which had total authorized capital (common shares and loans) of £393,400, issued £248,225 of that, and then topped that off with £733,833 of Lloyd's bonds. This 20-mile Welsh line was actually built. It continued to operate independently until 1882, but never became solvent. A 1870 report gave a good summary of the financial situation of this concern. At that point, its capitalization (after some changes, including a large cancellation of Lloyd's bonds) consisted of £203,128 in ordinary and preference shares, £60,500 in loans, and £502,214 in Lloyd's bonds, for a total of £765,842¹⁴⁹. Revenues in the previous full half-year came to £7,605, with expenses of £5,585, leaving a net income of £2,109, which, if it were devoted just to paying interest

¹⁴⁶ *The Times*, 4 April 1865, p. 12, "Money Market" column.

¹⁴⁷ United Kingdom (1866) *Select Committee of House of Lords on Cork and Youghal Railway Bill. Report*, Parliamentary Papers 1866 (209) XI.531. This report was very short, less than a page, and did not include any of the testimony the committee took. All the important parts of the report were reprinted in *The Times*, 13 April 1866, p. 10, "Money Market" column.

¹⁴⁸ British railways averaged about £30 thousand per mile, but the figure was considerably lower in Ireland, and should have been much lower in the easy terrain between Cork and Youghal.

¹⁴⁹ *Railway News*, 21 May, 1870, p. 560.

on Lloyd's bonds, would have paid 0.8% per year on those securities. That news account claimed the line could have been built for no more than £260 thousand, but even in that case, the return to investors would have been derisory. Thus this railway was one that would have been horribly wasteful from the standpoint of investors under the best of circumstances, and was a monumental loss due to the financial arrangements that were involved.

For both the Cork and Youghal and the Carmarthen and Cardigan railways, it was principally the availability of Lloyd's bonds that enabled outrageous expenditures, out of view of the public.

We next consider a very prominent and well-established line, the London, Brighton, and South Coast Railway (LBSCR). By 1866, it had invested about £16 million, which, relative to GDP, is comparable to £40 billion for the UK and \$400 billion for the U.S. today. It was among the larger lines in Britain at that time¹⁵⁰.

The LBSCR was not the largest railway scandal of that period, as that honor unquestionably belongs to the London, Chatham, and Dover Railway (LCDR). But it is more instructive in that the LBSCR case is far simpler, and because it had been one of the most respected lines in Britain, while the LCDR had a thick cloud of doubt and suspicion hanging over it for all of its existence¹⁵¹. Hence when the LBSCR's dire financial condition and the duplicity of its directors were revealed in 1867, there was an explosion of publicity and a further depression of railway securities prices. In the "Commercial History and Review of 1867," Newmarch opined that

[t]he most prominent topic of the year has been the discredit and exposure which has overtaken several of the largest Railway Companies. ... The most scandalous case of all is certainly that of the *Brighton Company*. Investigation has shown that for a series of years, the dividends paid on ordinary stock have been fictitious—that is to say, they have been paid by additions to capital—that extensions and new lines of the most absurd character have been undertaken, and that the entire administration of the Line has been reckless and irregular.

The LBSCR avoided bankruptcy, but only through some desperate measures, such as total suspension of dividends on ordinary shares, and a large issue of ordinary shares at a 55% discount¹⁵².

The LBSCR arose in the late 1840s through amalgamation of several lines, the largest and most prominent of them the London and Brighton Railway. That line resulted from an extremely competitive contest in the mid-1830s, with fierce public relations campaigns and heated Parliamentary committee hearings between the several diverse proposals. The

¹⁵⁰ The largest, the Great Western and the London and North-Western, had capitals of over £40 million each.

¹⁵¹ For example, *The Times*, 15 September 1865, pp. 4–5, called it "[o]ne of the most successful of English railways," and opined that it "appears to be a sound and well administered property." This was in a series on "Great English and French Railways," a series that expressed grave doubts about the LCDR, in issues of 12 February 1866, p. 7 and 12 April 1866, p. 6. *Railway Times* had many extremely critical leaders about LCDR, spread over many years, including a series subtitled "Will it pay?" in 1860.

¹⁵² As usual in such situations, those shares were offered to existing shareholders first, and they did purchase all of them. That eventually produced a very nice return for those who were able and brave enough to participate, as this line did claw its way back to prosperity in about half a dozen years.

interest in the line came primarily from the status of Brighton as a fashionable seaside resort for the upper and middle classes¹⁵³. While the original London and Brighton Railway was doing well in the run-up to the Railway Mania of the 1840s, it and the other lines that merged with it to form the LBSCR were badly damaged by that period of extreme investor exuberance which led to many new ventures that caused financial losses.

By the mid-1850s, the LBSCR was stabilized, and was producing a steady 6% annual dividend on ordinary shares, which was regarded as very good. But then, with Leo Schuster replacing Samuel Laing as Chairman, this line embarked on a new strategy, which involved rapid expansion. This caused some unease among shareholders and the railway press, in that while revenues were growing nicely, so was capitalization, while the income for ordinary shares was stationary. But the directors managed to fend off those complaints. In 1863 the dividend dipped to 5%, but this was the result of a substantial decrease in fares, which management justified on the grounds that it would help convince Parliament not to sanction some competing lines. There were also promises that increases in traffic would help restore profits, and this seemed to be born out in the next couple of years, as the dividend went up to 5.5% in 1864 and 5.75% in 1865. However, by 1866 the dividend declined to 4%, which was explained by the directors as due to some transient factors.

In early 1867 came the explosion. It was precipitated by a deal that the desperate managers of the LBSCR did with J. T. Mackenzie. They sold him £300,000 par value of 5% preference shares at a 10.5% discount (which was illegal), with the promise they would not sell any more shares in the next half a year. Mackenzie discovered this promise was not kept, and LBSCR was selling more shares. That led him to contact some influential LBSCR investors, and a meeting of the shareholders was convened, which nominated a committee to investigate the affairs of the company. That led to more meetings, disputes with the directors, and appointment of an official Committee of Investigation, which delivered its devastating report at the end of June 1867. That forced the resignation of the entire Board of Directors and installation of new management in July. It was led by Samuel Laing, who had been Chairman during the recovery from the financial damage of the Railway Mania of the 1840s.

A rough summary in round numbers of the financial history of the LBSCR is as follows¹⁵⁴. In 1856, the share and loan capital of the company was about £8 million, annual revenues were about £800,000, expenses were half of revenues, so the company was earning 5% per year on its total capital. Since much of the loan and preference share capital was obtained at rates below 5% per year, common shares could be paid 6%. By 1866, total capital had doubled to £16 million, but revenues had only grown by half, to £1.2 million per year. Further, most of the new capital was in preference shares that earned 5% per year, and so consumed all the additional revenue. But expenses had also grown, and so in order

¹⁵³ Currently the most detailed history of the LBSCR is the three-volume work by John Howard Turner. For this work, the most relevant is the second volume, which covers the period from 1850 to 1869: J. H. Turner (1978) *The London Brighton and South Coast Railway: II. Establishment and Growth*, London. It does have some coverage of the financial scandal treated in this section, but that coverage is light, and provides no serious details about the “financial innovation” that is the focus here.

¹⁵⁴ It was presented in similar terms in various press organs, for example in leaders in *The Times*, 11 May 1867, p. 9 and 6 February 1868, pp. 6–7.

to maintain the 6% annual dividend on common shares, directors resorted to accounting fraud.

The Committee of Investigation revealed that management had been charging various current expenses, in particular for maintenance of the line, to capital (that is, money that was supposed to pay for construction of new branches)¹⁵⁵. It had also borrowed a substantial sum of money from a bank, about £500,000, at high interest rates, but kept it out of the accounts presented to shareholders by taking out one- or two-day special loans to cover up the deficiency when the half-yearly balances were drawn up¹⁵⁶. Among other questionable moves, LBSCR's two auditors, who were elected periodically from among other shareholders, and were not professional accountants, and did not call on outside experts, were pressured to keep their reservations about company finances to themselves, and to produce glowing reports.

The accounting abuses cited above turned out to be quite common on British railways of the 1860s. In their essence they are not that different from various scandals in the recent past, except possibly for their relative simplicity.

We now concentrate on one aspect of the LBSCR that is most relevant in terms of illustrating how relaxed or evaded government regulation enabled the "creative finance" that powered the railway mania. Most of the public discussion and indignation aimed at LBSCR's directors arose from the treatment of three lines, Surrey and Sussex Junction Railway, Chichester and Midhurst Railway, and West Sussex Junction Railway¹⁵⁷. Mackenzie's bombshell revelation of illegal and surreptitious sales of LBSCR preference shares arrived just as the directors were asking shareholders to sanction takeover of those three lines. Before then, over the preceding two years, shareholders had approved LBSCR making equity investments in those lines, and had been told that this was in the interests of LBSCR, and might lead to full takeover eventually. But those lines were presented explicitly as independent ones. For example, just four days after the first meeting of dissident shareholders of 9 April 1867, Laurie, no longer Chairman of the LBSCR, but still a director, sent a letter to shareholders that declared¹⁵⁸:

these three lines, each was promoted originally by independent parties—without the concurrence and assistance, and against the wishes of our company—and that afterwards the directors, feeling it for your interest to prevent their falling into hostile hands, submitted from time to time to the meetings of our company proposals for

¹⁵⁵ The report was long, over 40 pages in total. The most complete version that has appeared in the press is in *Railway Times*, 22 June 1867, pp. 610–17, and a less complete version is in *Herapath's Railway Journal* of the same date, pp. 619–25, but neither version has the appendices, which make up almost half of the report.

¹⁵⁶ The accounts were with the Union Bank of London. The usual clubby, some would call them incestuous, relationships were present there. Leo Schuster, the Chairman of the LBSCR from 1856 to the beginning of 1866, and the person most responsible for its headlong expansion, was a director of the Union Bank. Peter Northall Laurie, head of the Union Bank, was a director of the LBSCR, and took over from Schuster as Chairman of LBSCR for slightly over a year. There were some negative comments when Laurie was declaring splendid financial results for the Union Bank while the LBSCR was on the verge of bankruptcy.

¹⁵⁷ These were of 24, 11, and 12 miles in length, respectively. Had they been built, they would have extended LBSCR's mileage by about a tenth.

¹⁵⁸ *Railway Times*, 22 June 1867, p. 610, part of the report of the Committee of Investigation. That is also the main source for the other statements below.

their absorption into our company's system, and in every case this step received the unanimous approval of those meetings.

This was an obvious distortion, an "alternate reality" in modern language, in that shareholders had been asked to approve, and did approve, only commitments of fixed amounts of equity capital, not complete takeovers. But it was a much greater distortion at a deeper level, since the shareholder committees (the preliminary one of April 1867, and the formal Committee of Investigation) revealed that those three lines had no real independence. Practically all the money they received came from the LBSCR (and it was £332 thousand in total), they had no real outside investors, and that starting in July 1865, May 1866, and March 1866, respectively, their directors were almost all either directors, employees, lawyers, or other people involved in the LBSCR. While the LBSCR shareholders has approved investment of £595 thousand in those three lines, their directors had undertaken to make them responsible for providing £1.36 million for their construction. This revelation completely destroyed the credibility of the old Board of Directors, and they were roundly denounced for their deception by shareholders and public opinion.

For us the most interesting aspect is the genesis of the three lines, before they were fully although surreptitiously taken over by LBSCR. One financial journalist wrote that there were reports of some "preliminary expenses" being paid, and that "one thing is very clear: somebody or other has been compensated—the chances are highly—for his inventive genius in devising lines which would never pay, but were only intended for sale"¹⁵⁹. This journalist further wrote that shareholders should find exactly what happened. Unfortunately such pleas do not appear to have led to any action. Shareholders seemed to be much more concerned with dealing with the duplicity of their directors, and avoiding liability for the much larger sums that would have been involved in construction than they were in the comparatively minor "preliminary expenses." However, we can get some hints from the report of the Committee of Investigation. For example, the initial promoters of the West Sussex Junction Railway were the lawyer and the engineer of the LBSCR, in combination with a contractor who worked frequently with that company. No details appeared to be available on any explicit or tacit communications with directors of the LBSCR when their efforts started, but when that line agreed to acquire the West Sussex Junction in March 1866, it promised to pay the promoters of that line £9,910 "in consideration of which payment the West Sussex promoters were to pay all their debts and liabilities to that date." The natural suspicion is that promoters, likely with a nod or wink from Schuster, went through the application process at their own expense, undertaking something that LBSCR directors had not been authorized to do by their shareholders, and did it in a way that was not explicitly ascribable to the LBSCR. Once they succeeded in obtaining their Act, they came to the natural and likely intended buyer, the LBSCR, and negotiated a sale which repaid them for their expenses and the risk they took that the application to Parliament might fail.

Of the other two of those three notorious lines, one had been started again by a group of people closely connected to the LBSCR, while the other one apparently was really independent. However, neither one had any true independent existence, the only substantial

¹⁵⁹ The "Trade and finance" column in *Daily News*, 13 May 1867, p. 4.

flows of funds came from the major railway that was acquiring them, the LBSCR. Thus they are additional examples of the type of entrepreneurial activity that was enabled by weakened regulations and creativity in law and finance, and which concealed what was happening from investors and the public.

Results of the mania of the 1860s

The railway mania of the 1860s was not a complete waste, although there were some extreme claims to that effect. Samuel Laing had presided over a recovery of the LBSCR from the damages of the Railway Mania. When he left in 1855 to take up a government post in India, the line was in excellent shape. He was then brought in as Chairman in the summer of 1867, and got to preside over a second recovery. In 1869, he told his shareholders that they had spent £4 million on extensions, and they “would have been much better off if they had converted [that sum] into bank-notes and lit their pipes with them”¹⁶⁰. For the economy as a whole, there were similarly dismal estimates. In the “Commercial History and Review of 1868,” Newmarch claimed it was likely that during the three years 1866–68, Britain had not “added much to its Accumulated wealth,” and listed a variety of reasons, prominent among them “the positive waste of scores of millions of capital in the idle and profligate schemes of the Prosperity Years.” But that seems slightly too pessimistic, even though there was a setback to the economy, and is contrary to the estimates we have now for the GDP of those years¹⁶¹.

The railway industry as a whole did not fall into ruin. There were certainly large losses for shareholders and creditors in many companies. However, as a whole, railways did not do too badly. Hackett’s statistics show earnings on total capital (that is, revenues minus operating expenses as a fraction of all money invested in the industry) starting out at 4.93% in 1842, rising to 5.48% in 1845 (the peak of the great Railway Mania, and a significant contributor to making that episode of investor exuberance as large as it was), crashing down to 3.31% in 1850, then rising, with some ups and downs, to 4.37% in 1865, and then descending to 4.01% in 1867, followed by a recovery to 4.83% in 1872¹⁶². Many of those reviled branches and extensions of the 1860s did pay something, even if they did not pay well.

The big difference between the 1840s and 1860s is that the Railway Mania of the 1840s tripled railway mileage and capitalization in Britain, so investment losses were giant and very visible. The mania of the 1860s consumed just about as much capital, but it started with a much larger base. It only grew railway mileage and capitalization by about 50%, and many of the losses were absorbed into the accounts of the large established railways, and eliminated what would likely have been substantial increases in profits from the traffic

¹⁶⁰ *The Times*, 4 August 1869, p. 10.

¹⁶¹ Mitchell, *op. cit.* (note 71), p. 838 shows GDP growing about 1.5% per year from 1866 to 1868, about half the rate of the first half of the decade, but still very respectable by the standards of the first half of the 19th century. Newmarch may have been misled through the heavy reliance that was placed in those days on statistics of foreign trade, which did show exports declining in that period.

¹⁶² *Herapath’s Railway Journal*, 11 January 1873, pp. 27–28. The revenue, expense, and capitalization figures are all from the official reported figures, so, primarily for expenses and capitalization, are distorted by accounting frauds and “creative finance.” Still, the basic picture they provide appears reasonably accurate.

generated by a rapidly expanding economy. So the losses overall were not as painful as two decades earlier.

The railway mania of the 1860s did expand that industry by about half, but it also reinforced its inefficiency, as will be discussed in the next section. Still, demand for railway service was such that mileage increased by a third over the next half a century, and capitalization by about 150%.

One contribution of the railway mania of the 1860s to the development of modern capitalism does not seem to have been covered in the literature. It had two aspects. One concerns the legal and institutional framework of modern corporate capitalism, the other the role of company promoters.

Considering those two in reverse order, we should note that the 1860s offered promoters a great opportunity to develop and hone their skills. Promoters have always been key to large projects, and often were technologists or large investors. But there was also a rise of a class of opportunistic actors with no special ties to the ventures they were promoting, such as Augustus Reginald Dunshunner and Bob M'Corkindale of the Glenmutchkin Railway, who were eager to have "a pluck at the public pigeon." There were many such in the Railway Mania of the 1840s, although they tended not to be drawn from the idlers, as with the protagonists of the Glenmutchkin story, but from the ranks of engineers and lawyers. Up to that time, they became prominent largely at peaks of booms, and faded from sight afterwards. But by the end of the 19th century, they formed a substantial class that was constantly active, and not just responding to a particular technological or business innovation, but moving from industry to industry. Much of what they did is now generally in the domain of investment banks. To cite the abstract of a piece about them¹⁶³:

The years from 1880 to 1914 were the City of London's 'Golden Age.' They were also the heyday of the City company promoter, but many of their undertakings were distinctly fool's gold. The company promoter of the pre-Great War decades was an ancestor of the modern investment bank and also of the private equity business.

However, while they were indeed most prominent after 1880, it is likely that an important early stage in the evolution of the promoter system came during the investment mania of the 1860s. That's when people like Albert Grant began flourishing. Sometimes regarded as a model for Augustus Melmotte, the crooked financial operator in Trollope's *The Way We Live Now*, Grant set up the Mercantile Discount Company in 1859, which engaged in some "creative financing" before folding in less than two years. He then went on to establish the much larger, more prominent, and more destructive Credit Foncier and Mobilier of England in 1864. After being kicked out of it after the collapse of the mania, he went on to a long career that appears unparalleled for the number of investor lawsuits. Yet in spite of extensive evidence against him, and extensive publicity, Grant managed to stay out of jail, was elected MP a couple of times, and for a while lived in a grand style, which

¹⁶³ J. Nye (2015) "Boom, crisis, bust: Speculators, promoters, and City journalists, 1880–1914," pp. 215–26 in S. Schifferes and R. Roberts, eds., *The Media and Financial Crises: Comparative and Historical Perspectives*, Oxon. Another article about the role of British promoters is J. Armstrong (1990) "The rise and fall of the company promoter and the financing of British industry," pp. 115–38 in J. J. Van Helten and Y. Cassis, eds., *Capitalism in a Mature Economy: Financial Institutions, Capital Exports and British Industry, 1870–1939*, Aldershot.

included donating Leicester Square to the nation. (The practice of shady characters trying to improve their public image by charitable activities is not a modern invention.) In one of his trials, he was very frank about his approach to finance¹⁶⁴: “The public were like fish; it was impossible to tell what kind of fly would catch them. ... The public often reject a sound undertaking and take a spurious one.” His main occupation was to dangle different types of fly in front of British investors, and see which would catch them, and, like later promoters, he was constantly active.

Other promoters may not have been as open about their cynicism, but appeared to be inspired by the same attitude. That they were not restrained for a long time has not been explored much in the literature. In particular, there is the question as to whether the attitude of policy makers was not that of the author of the letter to *The Times* in 1866 who was quoted before¹⁶⁵:

you cannot by standing orders or Acts of Parliament make men prudent or prevent rash expenditure of money. If speculators are prevented from spending their money in one way they will do it in another. What will probably happen will be that they will expend the capital upon some undertaking which is less certainly conducive to the general welfare than a railroad.

After all, the much desired railway expansion was achieved in the 1860s with the help of such promoters, so the opinion may have been that it was best to allow them to operate.

The perceived public benefit of improved railway service provision very likely also contributed to the continuing toleration of what were perceived as excesses of joint stock enterprise. As was pointed out in a recent book by James Taylor, there was a strong negative reaction among the public to the financial debacles of the 1860s, and calls for placing restraints on general speculation, on promotion of new companies, on the relaxed limited liability rules, and on company management¹⁶⁶. Yet, very little was done, aside from the imposition of audit requirement on railways through the Regulation of Railways Act, 1868, that was mentioned before. In Bagehot’s words, a committee of the House of Commons “was asked to confine limited liability; it has extended and completed it”¹⁶⁷. Taylor ascribes this to a “reconceptualisation of the joint stock company.” But it is not unnatural to give credit to the view that those denigrated features of the financial system did serve to prevent speculators from “expend[ing] the[ir] capital upon some undertaking which is less certainly conducive to the general welfare than a railroad.” This is a topic that will be treated in more detail in a future work.

¹⁶⁴ *The Times*, 12 July 1876, p. 11, one in a series of reports on the famous trial of Twycross v. Grant.

¹⁶⁵ *The Times*, 4 June 1866, p. 5, letter of “H.” on “Lord Redesdale and railway legislation.”

¹⁶⁶ J. Taylor (2006) *Creating Capitalism: Joint-stock Enterprise in British Politics and Culture, 1800-1870*, Woodbridge.

¹⁶⁷ *Economist*, 31 August 1867, pp. 982–83, leader entitled “The new Joint Stock Companies Act.” The report of the committee, set up at the behest and chaired by Edward Watkin, the “Second Railway King,” is United Kingdom (1867) *Report from the Select Committee on Limited Liability Acts*, Parliamentary Papers 1867 (329) X.393.

Missed opportunities

The railway mania of the 1860s did much to satisfy the widespread desire for an enlarged railway system. But it did so very inefficiently, and so magnified the inefficiency that already plagued that infrastructure. With some careful data collection and analysis, a much better network could have been built, even aside from the waste involved in the financing operations, which increased the cost of what was built.

Mark Casson has shown that the British rail system on the eve of World War I could have been replaced by one that provided equivalent service, but with reductions in cost and mileage in the 25–35% range¹⁶⁸. This is actually consistent with some estimates made by railway engineers in the 19th century, but Casson went beyond those in providing an actual network design that very likely would have achieved those savings. However, Casson's claim that similar savings could have been achieved with a modest change of policy in 1845–46 is unlikely to be correct. The problem is that with very few exceptions, the general public as well as policy makers and railway industry experts held incorrect notions about locality of traffic and nature of growth of demand¹⁶⁹. They expected that once a line opened, traffic on it would build up over a couple of years, and then level off. Further, they thought most of the revenue came from transporting passengers between terminal cities on a line.

By the 1860s, the knowledge of continuing growth was spreading, but was still not firmly settled in many people's minds. For example, a railway paper noted in 1861 that¹⁷⁰

[i]t seems unreasonable where a line 100 miles long between two points has been open for years that its traffic should year after year increase, generally speaking in the first eight years doubling itself and afterwards continuing to increase; but it is a fact that such an increase does take place. We believe there is no old railway in this country whose traffic has yet done growing. Why this is we cannot say.

Others were more certain. For example, Edward Watkin was very clear on this topic in 1865, and explained why continual growth meant one of the favorite nostrum of many investors, as well as of such respected authorities as *The Times*, namely "closing the capital accounts," was not feasible¹⁷¹. What was missing was a firmer belief in continuing growth, and trustworthy quantitative studies of the rates of growth that were likely¹⁷².

The importance of local traffic was still not well understood in 1860s, and in general is still not fully appreciated even today, as was already discussed in an earlier section.

¹⁶⁸ M. Casson (2009) *The World's First Railway System: Enterprise, Competition, and Regulation on the Railway Network in Victorian Britain*, Oxford.

¹⁶⁹ A. M. Odlyzko (2016) "The early British railway system, the Casson counterfactual, and the effectiveness of central planning," *Essays in Economic & Business History*, vol. 34, pp. 60–94. Online journal version: <http://www.ebhsoc.org/journal/index.php/journal/article/viewFile/322/302>.

¹⁷⁰ *Herapath's Railway Journal*, 5 January 1861, p. 14.

¹⁷¹ *The Times*, 28 January 1865, p. 6. The first Railway King was George Hudson of Railway Mania infamy.

¹⁷² As an example we can cite the speech of Leo Schuster, the Chairman of the LBSCR, in which he mentioned that "[i]t takes years to develop these resources [i.e., traffic on new branches]" without specifying how many years, *Herapath's Railway Journal*, 30 July 1864, pp. 866–68. In 1869, Samuel Laing stated at a meeting of the shareholders of the LBSCR that the average rate of growth of revenues on English railways was from 2 to 4% per year, *Herapath's Railway Journal*, 7 August 1869, p. 779. This is far from the 9% annual growth rate cited in the quote above from a leader in that paper in 1861.

Gravity models, discovered by Desart in the 1840s, had been forgotten, and would not be used widely in transportation planning until the 20th century¹⁷³. It is worth noting that Casson's re-design of the British rail network is based on estimates of traffic demands derived from gravity models, since we do not have actual data for the traffic volumes of 1914 that would be ideal. In general, gravity models are never exact, but they do provide rough estimates of demand that are good enough so they are indispensable in modern transportation or urban planning, or trade economics. As it was, debates about wisdom of building branches and extensions in the 1860s were generally conducted without any impartial quantitative estimates, based mostly on the intuition of the participants¹⁷⁴.

To apply gravity models to rail network planning in Britain in the 1860s would also have required collection and analysis of data. Had this been done, and combine with estimates of growth rates, a much better network would surely have been designed.

Even in the absence of growth or locality estimates, it seems a more efficient expansion of the British rail network could have been designed in the 1860s had a more centralized approach been taken, one which considered demands from various localities. There were many complaints from contemporaries about inconsistent decisions by Parliament. Surely an even greater defect was that schemes were considered separately from each other, and much depended on various chance factors as well as skills and personalities.

The counterargument to all the hypotheticals above is that had people been as rational, diligent, and inquisitive as needed to carry out the recommended steps, very little railway construction would have been done in the 1860s, as investors would have known they could only obtain miserable returns. Provision of much-desired railway connectivity would then have required development of new approaches, such as those mentioned earlier, and in the British political system of the 19th century that would have taken a long time. Instead, "the roving cavaliers of credit," together with contractors, engineers, and other helpers managed to bamboozle investors into financing a giant expansion.

Conclusions

"This time is different" is often claimed to be a dangerously misleading meme that lures people into danger and destruction. But we should admit there is truth to this adage, as every time is different, typically in many ways. So we cannot expect to draw exact lessons from one historical episode for another. In particular, while there are many analogies between the current demand for improved broadband access and that for increased railway service in the 1860s, it seems unrealistic to expect anyone could fool investors today through

¹⁷³ Odlyzko (2015) *op. cit.* (note 65).

¹⁷⁴ As an example, many shareholders of the LBSCR, and even *The Times* (the latter in a leader in the issue of 26 August 1867, pp. 6–7) claimed that the line would have done just fine had it abstained from building any branches and extensions, and just paid attention to its original line. But Leo Schuster, the Chairman who presided over its disastrous ventures, pointed out at several shareholder meetings that only about 20% of the revenues of the line were coming from the traffic between London and Brighton. See for example *Herapath's Railway Journal*, 31 January 1863, pp. 98–101.

chimerical profit projections into building out telecommunications networks and losing their shirts in the process¹⁷⁵.

As an example of the drastic differences between those times and ours, ordinary shares earned their owners less in monetary terms than debt (but did provide a hope of higher returns). It was only around the end of the 19th century that British railway investors started earning as much on equity as on debt (about 3.5%, as opposed to the new Consols that were paying about 2.75%). One could argue that this is closer to what the basic logic of capitalism would predict, but that is very far from what we observe today.

Another difference, related to the one discussed above, is the high level of capital investment in railways in Britain in the 19th century. Annual revenues of that industry were on the order of £30 million per year. As Fig. 2 shows, both before and after the railway mania of the 1860s, industry capital investment (capex) was running typically not far short of 30% of that, and during the peak of the mania it reached 100%. Today, telecom boasts, but also complains, of how it is hard to justify the supposedly high capex it pays for, yet it is only around 15% of revenues.

Still, although the economy has changed, there are common themes that do repeat. One clear lesson from the 1860s that arose in subsequent manias is the danger of combining “financial innovation” with opaque accounting, especially in complex systems. Another is that even very clever observers, such as Bagehot and Newmarch, sometimes fail to see the signs of dangerous instability, even when they search for them. And sometimes even very clever observers, such as Bagehot and Newmarch, fail to take into account some glaringly obvious information, such as that on volume of railway investment in their case.

In summary, this work provides some new perspectives on the railway mania of the 1860s, in particular on its intimate connection with financial developments. It also shows how little is known about those connections, and this will hopefully stimulate much further research in railway history. That would be of interest not just in illuminating an interesting period in the development of that industry, but also would be of use in filling in gaps in our knowledge of the development of finance and the whole economy, and might provide guidance for the future.

Acknowledgments

The many individuals and institutions that provided assistance in this project, and the larger one of which it is a part, namely on the interaction of technology and finance and the rise of modern capitalism, are listed at

<http://www.dtc.umn.edu/~odlyzko/doc/mania-ack.html>

¹⁷⁵ This did happen to some extent in the Internet bubble, with the green-field fiber networks in the United States, and 3G wireless spectrum auctions in Europe, but not very efficiently, and it seems unlikely the process could be repeated. Currently similarly chimerical prospects appear to be successfully employed to lure investments into other areas.