

Elite directors, London finance, and British overseas expansion: Victorian railway networks, 1860–1900[†]

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This article considers how international economic expansion impacts on the composition of elite groups on boards of companies. We examine, why, at the height of the British Empire, boards of national, imperial, and international railway companies, financed from London, were dominated by elites drawn differentially from the aristocracy, the military, finance, and politics. To investigate the reasons for these differences, we conduct a social network analysis of railway company boards in three countries during the second half of the nineteenth century. Results reveal that aristocratic directors were dominant in Britain, military directors in India, and financier directors in Argentina, suggesting that their influence drew on local knowledge, resource access, and network connections. They did not serve on boards for merely ornamental purposes.

The role of the British elite in the expansion of the international economy before 1914 has attracted significant research interest.¹ Several reasons for the prominence of elite groups on company boards have been suggested, including accessing finance, and enhancing the value of businesses on capital markets.² Empirical results are mixed, with some suggestion that aristocrats, in particular, performed only an ‘ornamental’ function to attract investors to otherwise low-quality issues, without full participation in their firms’ administration.³ In this article, we examine whether the presence of elite directors reflected the expertise required by the international location of investment, including their ability to access resources, such as connections to human, social, and financial capital, and their ability to influence governments through political access and lobbying. If the evidence supports this view, it calls into question the emphasis in the prior literature on the selection of elite directors mostly for the purposes of signalling the quality of new issues and their otherwise marginal contribution to the management and value of their firms.

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¹ Cain and Hopkins, *British imperialism*; Chandler, *Scale and scope*.

² Amini and Toms, ‘Accessing capital markets’; Braggion and Moore, ‘Economic benefits’; Franks, Mayer, and Rossi, ‘Ownership’; Rutterford, Sotiropoulos, and van Lieshout, ‘Individual investors’; Fjesme, Galpin, and Moore, ‘British IPO directors, 1891–1911’.

³ Burhop, Chambers, and Cheffins, ‘Regulating IPOs’; Hannah, ‘Pioneering’; Braggion and Moore, ‘Economic benefits’; Campbell and Turner, ‘Legal protection’.

To do this, we contrast elite board membership in railway companies, financed by the City of London, across different international locations. Britain was a dominant investor in many railway networks as they developed internationally, particularly after 1870.⁴ The literature shows clearly that strongly contrasting circumstances and priorities influenced the establishment of overseas railways. Governments, and their institutional configuration in different countries, impacted on the construction of railways and their managerial control.⁵ These differed between Britain and the British Empire, Britain and third countries, and the British Empire and third countries. To reflect these contrasts, the article uses social network analysis to identify dominant types of elite directors of companies listed on the London Stock Exchange (LSE), for British, British Empire, and international railway companies. We use India and Argentina as examples of the latter two categories. Using a dataset of individual directors serving on the boards of railway companies with lines in Britain, India, and Argentina, we demonstrate that the circumstances of domestic, imperial, and international economic expansion significantly mediated firms' board and governance characteristics.

In the modern corporate governance literature, directors demonstrate role legitimacy through holding positions consonant with their backgrounds and resource legitimacy to signal the firm's access to social, human, and investment capital through board member affiliations.⁶ In our analysis, role legitimacy promotes political influence through effective lobbying, and resource legitimacy facilitates access to financial, specialist human capital, and land resources. Network connections underpin role and resource functions, such that interlocking directorates facilitate the acquisition of resources and political influence and the dissemination of information and innovation, reduce coordination costs, and reveal information about the agendas of other firms.⁷ These functions indicate reasons why particular companies might recruit specific categories of elite directors to their boards. British economic expansion in the nineteenth century provides a useful contextual testing ground for these relationships as a contribution to the corporate governance literature, given the heterogeneity of elites and their greater categorical distinctiveness, compared to more recent datasets.⁸ We examine these rationales of director selection, adding to the literature on elites and British international expansion by offering new empirical evidence on the LSE and the development of British and international rail infrastructure.

The remainder of the article is structured as follows. The next section justifies the selection of the three country-level case studies and reviews the relevant prior literature on the development of railways and the role of elites. Section II describes the methods used to construct the dataset and conduct social network analysis to identify dominant individuals and groups in each country. Sections III to V consider the evidence for Britain, India, and Argentina in more detail. Section VI concludes.

⁴ Roth and Dinhobl, eds., *Across the borders*.

⁵ Dobbin, *Forging industrial policy*, p. 163.

⁶ Hillman and Dalziel, 'Boards of directors'; Higgins and Gulati, 'Stacking the deck'.

⁷ Boeker and Goodstein, 'Organizational performance'; Hillman and Dalziel, 'Boards of directors'.

⁸ According to data accessed via *Creditsafe* (accessed June 2019; we are grateful to Prof. Nick Wilson of the University of Leeds for access to this database) featuring directors of all present-day Companies House registered companies, < 1% had readily identified elite titles.

I. Railway development and elites in Britain, India, and Argentina

Britain, India, and Argentina are selected as country-level case studies because the histories of their railway networks point to differing reasons for elite involvement at board level. Each is considered briefly in turn.

British institutions stressed individual sovereignty accountable to Parliament, rather than centralized state-backed finance. State policy was to empower entrepreneurs, trusting that the most profitable routes would also be the most rational.⁹ As landowners with significant political influence, aristocrats at first presented an obstacle to the development of the domestic railway network.¹⁰ However, by the mid-nineteenth century, as measurement replaced social capital based on trust, they had become substantial investors in rail firms and, as such, enablers of the network and further industrialization.¹¹ Directors were typically part-time and selected for their ability to negotiate the interests of the railway, as aristocrats influential in county administration or politicians wishing to promote prosperity in their constituencies, and as promoters of financial, shipping, and transport interests.¹² Landowners were recruited to railway boards to promote such interests without becoming involved in railway management technicalities. Some board members had engineering and managerial backgrounds, albeit recruited from elite educational institutions, and were frequently knighted once promoted to the board.¹³ Chairmen emerged from upper-middle- and upper-class origins, underpinning an ‘aristocracy of big business’.¹⁴ Lawson noted a well-defined gap between the directorate and the executive.¹⁵

Elite dominance thus had a mostly amateurish character. The British model was unique, and, by the late nineteenth century, poorly managed and financially unsuccessful, and not even replicated to any significant degree in the Empire.¹⁶ It therefore serves as a basis for comparison with railway networks that were financed from London but constructed overseas and administered with substantial British influence.

In India, railways reflected strategic considerations and British military security had an essential influence on railway construction.¹⁷ Such pressures, exercised through state power, skewed the development of the network,¹⁸ although finance was substantially private, raised via the LSE. To encourage private British investment, the government of India agreed to financial obligations, devolved upon the taxpayers of India, not those of the UK. The government of India would contribute each year to each railway that failed to earn 5 per cent of the capital invested, to allow the payment of an equivalent dividend.¹⁹ These guarantees helped overcome information asymmetry for overseas investors.²⁰ Towards the end

⁹ Dobbin, *Forging industrial policy*, p. 166.

¹⁰ Casson, *Railway system*, p. 20.

¹¹ Allen, ‘Theory’; Biddle, ‘Landowners’; Beckett, ‘Aristocratic contribution’.

¹² Channon, ‘Recruitment’.

¹³ Gourvish, ‘British business elite’, p. 309, identifies 31 conferred over a 70-year period.

¹⁴ Perkin, *Age of the railway*, p. 172.

¹⁵ Lawson, *British railways*, pp. 218–19.

¹⁶ Mitchell, Chambers, and Crafts, ‘Profitability’; Lawson, *British railways*, p. 226.

¹⁷ Cain and Hopkins, *British imperialism*, p. 291.

¹⁸ Kerr, *Engines of change*, p. 13.

¹⁹ Thorner, ‘Great Britain’.

²⁰ Eichengreen, ‘Financing infrastructure’; MacPherson, ‘Investment’, p. 18.

of the century, British investment diminished because the Indian central or state governments took back ownership as concessions expired, typically after 25 years.²¹

In contrast to India, Argentina provides an overseas example of substantial British involvement, but outside the formal Empire. Argentina was the most important country in terms of investment, with its railways dominantly owned by foreign, and specifically British, capital.²² Recognizing the need to attract foreign capital, like in India, Argentine governments guaranteed returns to investors. Their concession policy assured investor profits of 7 per cent.²³ Actual profits proved excessive, leading to speculation and the Barings crash of 1890, which did not prevent subsequent booms in railway building.²⁴ Significant bond issues underpinned the increase in British capital invested in Argentine rail during the years 1892–1900. The Argentinian model was emulated elsewhere in Central and South America, and by 1899, London accounted for 70 per cent of mileage under operation in Latin American railways as a whole.²⁵

The three countries thus developed their railway networks according to differing economic rationales. The structure of land ownership, nascent manufacturing zones, and infrastructure were important in Britain. In India, priorities were determined by the military security of an imperial strategic market. In Argentina, financial interests required negotiation with local political interests to secure concessions to support commodity export trade and manage associated risk. These differences suggest alternative justifications for appointing elite directors to the boards of railway companies, offering explanations of board composition that complement alternative hypotheses derived from financial theories based on agency, signalling, and market access.

II. Measuring elite network dominance

To investigate dominant elite groups, we obtained the names of all directors for all LSE quoted mainline railway companies with operations in Britain, India, and Argentina. We selected quoted railway companies from the December issues of the *Investor's Monthly Manual* (hereafter the *IMM*) and board membership details from *Bradshaw's General Railway Directory, Shareholders' Guide, Manual and Almanack* (hereafter *Bradshaw's*). We also collected data on bankers, solicitors, engineers, and brokers for each company.

To conduct a comparative analysis of the elite composition of boards, we used two census dates, 1869 and 1895. Because network construction in India and Argentina began later than in the UK, 1869 represents the earliest date for practical comparison of boards' elite composition across the three countries. We used four elite types, based on their prominence in the literature on elites: aristocrat, politician, military, and financier.²⁶ We use a broad definition of 'aristocrat'

²¹ Corley, 'Britain's overseas investments', p. 85.

²² Duncan, 'British railways'.

²³ Ferns, 'Investment and trade'.

²⁴ Cain and Hopkins, *British imperialism*, p. 259.

²⁵ Ferns, 'Investment and trade'; Bignon, Esteves, and Herranz-Loncán, 'Big push', p. 1283.

²⁶ Defined respectively according to the peerage and conferred titles, senior military rank designation, Member of Parliament, director of bank or financial service company. Recent papers have considered aristocrats/peers and/or MPs (Burhop et al., 'Regulating IPOs'; Braggion and Moore, 'Economic benefits'; Campbell and Turner, 'Legal

inclusive of landed gentry and promoted knights in line with Weber, who noted shared economic attitudes, and Cain and Hopkins, who argue that gentlemen are made as well as born in a constant evolutionary process.²⁷ In similar vein, Acheson et al. note that the ‘landed gentry... made up the second tier of the aristocracy’ and continued to signal elite status in the second half of the nineteenth century.²⁸ To examine the gentlemanly capitalism hypothesis in its international context, our inclusive definition allows us to document promotion to elite status, including in India, where a new ‘aristocracy’ was created. Our approach contrasts with narrower definitions in other studies of elite boards, whose purpose is to measure preordained political influence exercised through the House of Lords.²⁹

We also collected data for other context-specific designations indicative of influential roles, but which fall outside elite categorization: lawyers, engineers, merchants, industrialists, and government officials. Annual volumes of *Bradshaw’s* were used to identify directors and the individuals or firms performing advisory functions, and the period for which railway directorships were held.³⁰

To assign individuals to elite sub-groups at each census date, we obtained information from biographical and newspaper sources.³¹ Directors identified as aristocrats were classified according to their inheritance, date of conferment, and appearance at the two census dates.³² Aristocrats with inherited titles were classified as aristocrats regardless of a subsequent business, political, or military career. Promoted aristocrats were classified according to status at the census date. Where knighthoods and honours were conferred before the census date, the individual was classified as an aristocrat. For directors who served as politicians, relevant dates were established or confirmed using election results data.³³ Where there were career changes—for example, when a financier became a politician—we assigned the primary role according to the census date and noted the secondary career role. Sensitivity analysis was conducted by swapping the primary role into the secondary role.

Comparative cross-sectional analysis based on the two census dates facilitates our methodology, which is to conduct a social network analysis of elite directors, quantifying the dominance of elite groups and individuals within them. Social network analysis characterizes networked structures in terms of nodes and ties (edges). Networks can be conceptualized organizationally, as networks of firms connected by directors, or as an intra-class phenomenon, as networks of

protection’; Grossman and Imai, ‘Taking the lord’s name’) and political and military directors (Fjesme, Galpin, and Moore, ‘Efficient market’).

²⁷ Weber, *Economy and society*, p. 307; Cain and Hopkins, *British imperialism*, p. 38.

²⁸ Acheson, Campbell, and Turner, ‘Expansion’, p. 613.

²⁹ Burhop et al., ‘Regulating IPOs’; Braggion and Moore, ‘Economic benefits’; Grossman and Imai, ‘Taking the lord’s name’.

³⁰ National Railway Museum, York archive, RSM/10-61, *Bradshaw’s Railway Manual, Shareholders’ Guide and Official Directory* (London: Henry Blacklock & Co.).

³¹ *Oxford dictionary of national biography*, <https://www.oxforddnb.com/> (accessed June 2020); Jeremy and Shaw, eds., *Dictionary of business biography*; *Grace’s guide to British industrial history*, <https://www.gracesguide.co.uk> (accessed June 2020). Newspaper obituaries, sourced from *British Library newspapers, parts I–V*, hosted by Gale Primary Sources, <https://www.gale.com/intl/primary-sources> (accessed June 2020).

³² Debrett, *Debrett’s illustrated peerage*; Cokayne, *Complete peerage*.

³³ Craig, ed., *British parliamentary election results, 1832–1885*; idem, ed., *British parliamentary election results, 1885–1918*.

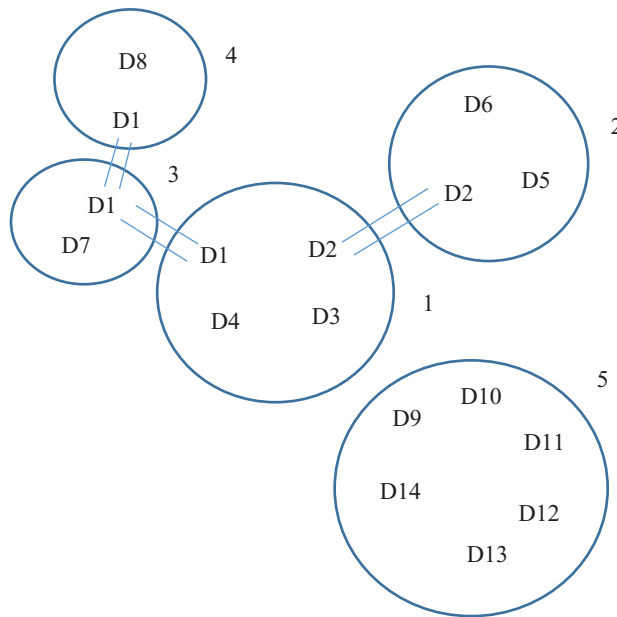


Figure 1. *Diagrammatic illustration of our network construction*
 [Colour figure can be viewed at wileyonlinelibrary.com]

Notes: Circles 1–5 represent companies. D1–D14 represent directors.

individuals connected by firms.³⁴ We emphasize the latter to highlight the roles of elite individuals and their connections. Network parameters are set as directors of sample railway companies at each census date and the following advisory roles: brokers, solicitors, bankers, and consulting engineers. These roles measure directors' ability to use their network influence by performing brokerage functions³⁵ to fill gaps in networks and potentially attract financial resources, as well as financial, legal, and technical expertise.

The example in figure 1 illustrates our network construction. There are five companies (circles 1–5) and 14 directors (D1–D14). D1 sits on the board of three companies (1, 3, and 4). D2 sits on the board of two companies (1 and 2). All other directors sit on the board of just one company. If two directors are on the board of the same company then they are directly connected (for example, D1 and D2).

Degree centrality is the number of direct connections a director has within the network and measures network influence. It proxies individuals' ability to access and share knowledge and other resources and thereby influence the wider network. For example, node D1 has a degree of 5 as it is connected directly to five other directors (D2, D3, D4, D7, and D8) and node D3 has a degree of 3 as it is directly connected to three other directors.

The degree centrality measure does not necessarily reflect the positional advantage of a node in the network, as the number of direct connections may

³⁴ Burris and Staples, 'Search'.

³⁵ Burt, *Brokerage*.

not accurately reflect a director's ability to control information and resource flow and to coordinate otherwise disparate parts of the network. For example, D1 and D9 both have a degree of 5. However, D1 has a better informational advantage associated with network position, acting as a bridge between more directors via indirect connections. For example, D4 and D8 are indirectly connected via D1. The number of indirect connections between two nodes is a path. For example, the path between D6 and D7 has three connections: D6–D2, D2–D1, and D1–D7. Betweenness centrality measures the number of times a node lies on the shortest path between other nodes. It highlights nodes acting as 'bridges' in a network, proxying for a director's ability to control information and resource flow and to coordinate otherwise disparate parts of the network. The betweenness measure for D9 is less than the betweenness measure for D1. D9 never lies on the shortest path between other nodes (its betweenness is 0), whereas D1 lies on the shortest path between other nodes 11 times (for example, in the shortest path between D3 and D7 or between D2 and D8).

Degree and betweenness centrality are calculated for all the directors in each of the railway networks (574 directors) to identify significant individuals within each network.³⁶ These results inform our later discussion in sections II, III, and IV, where we discuss each railway network separately focusing on significant individuals in each network.

Before considering individual directors, we begin our analysis by examining the aggregated features of the six networks.³⁷ First, we measure the overall network centrality using Freeman degree centrality, which describes cohesion around particular focal points. It shows the variation between the degree centrality scores among the nodes. It is defined, for a given network with nodes $v_1 \dots v_n$ and maximum degree centrality c_{max} , as $\Sigma(c_{max} - c_{(vi)}) / ((n-1)(n-2))$, where $c_{(vi)}$ is the degree centrality of node v_i . In our example, maximum degree centrality between directors (c_{max}) is 5. The degree centrality measures for directors 1 to 14 ($c_{(vi)}$) are 5, 5, 3, 3, 2, 2, 1, 1, 5, 5, 5, 5, 5, 5 respectively, and n is equal to 14. Therefore, the Freeman degree centrality of the network in this example is 0.115.

Second, we consider density, which describes the general level of cohesion in a network, defined as the number of connections divided by the total number of possible connections.³⁸ In the example, the total number of possible connections between the 14 directors is the number of ways to choose two directors among the 14 directors (the number of two-combinations out of 14) and is equal to 91. The number of actual connections in the network is 26, and therefore the density of the network is 26/91 (0.286).

Third, we measure average geodesic distance, which is the average distance between pairs of nodes in the network. Geodesic distance is defined as the number of connections between two nodes in the shortest path connecting them. Average geodesic distance is the average distance between pairs of nodes in the network. It

³⁶ Given the large number of directors in this study (574), individual degree and betweenness measures are not tabulated.

³⁷ All measures were calculated using the UCINET program and definitions, http://www.analytictech.com/ucinet/help/3ava_zr.htm (accessed on 13 Feb. 2019). See also Scott, 'Social network analysis', pp. 113–15; Freeman, 'Centrality'.

³⁸ We exclude possible indirect linkages between directors, for example, via financial and industrial companies, and their boards due to data restrictions. Network densities are therefore lower-bound estimates.

Table 1. *Railway director summary statistics*

Year		Total director	Total elite	Total elite			
				Aristocrat	Military	Politician	Financier
1869	Britain	192	114	25.43	12.28	29.82	32.45
	India	54	33	12.12	33.33	30.30	24.24
	Argentina	23	10	10.00	10.00	50.00	30.00
1895	Britain	170	113	56.63	10.61	21.23	11.50
	India	76	59	23.72	47.46	8.47	20.33
	Argentina	59	40	20.00	10.00	17.5	52.50
Totals (%)				32.52	18.97	23.03	25.47
Totals (N)		574	369	120	70	85	94

Note: The share of directors in each category of elite sums to 100% because each is exclusively allocated first categorization used in the analysis here.

Sources: Quoted railway companies identified from *IMM* and individual directors from *Bradshaw's*.

therefore measures small-world effects in networks, that is, the ease with which one part of the network influences another. In our example, we have 26 paths with 1 connection between directors (for example, the path between D1 and D2, or the path between D13 and D14), we have 13 paths with 2 connections (for example, the shortest path between D1 and D5 consists of 2 connections: D1–D2 and D2–D5), and we have 4 paths with 3 connections (for example, the shortest path between D6 and D7 has three connections: D6–D2, D2–D1, D1–D7). Therefore, the average geodesic distance in our example is 1.488.

Finally, the group exchange score was used to measure dominance according to the relative importance and connectivity characteristics of elite sub-groups. It is defined as the number of reciprocal ties connected to one group (aristocrat, military, politician, financier, and so on) divided by the total number of reciprocal ties in the network.³⁹ The rationale behind the group exchange analysis is that dominant groups consist of individuals with more connections to the rest of the network. We are thus able to show how groups exercised their dominance. In the example, suppose that D1, D2, D10, and D12 are aristocrats and D6, D7, and D8 are engineers. The total number of connections that aristocrats (D1, D2, D10, and D12) have is 20 (5+5+5+5). The total number of connections that engineers (D6, D7, and D8) have is 4 (2+1+1). Finally, the total number of existing connections in the network is 26. Therefore, the group exchange measure for the aristocrats is 20/26 (0.769) and the group exchange measure for the engineers is 4/26 (0.154), suggesting that aristocrats are more dominant than engineers.

Table 1 shows the size of each network according to the number of individual directors, grouped by elite category. The data provide indicative support for our central hypothesis of differential reasons for appointing elite directors according to local circumstances of economic expansion. Of the 574 individuals identified, 64.29 per cent fell into one of the four elite categories. Aristocrats were the largest sub-group, and most conspicuous in British railway companies. Directors with military designations were most prominent in India. Politicians and financiers were more pronounced in Argentina than elsewhere, although the former group

³⁹ Fliervoet, Geerling, Mostert, and Smits, 'Analyzing'.

Table 2. *Characteristics of railway companies with hereditary vs. promoted aristocrats*

Year		No.		Average board size		Average mileage		Average firm age (years)	
		Hereditary aristocrats	Promoted aristocrats	Hereditary aristocrats	Promoted aristocrats	Hereditary aristocrats	Promoted aristocrats	Hereditary aristocrats	Promoted aristocrats
1869	Britain	19	10	12.73	13.07	340.11	470.16	14.26	14.45
	India	2	2	6.50	7.25	209.00	521.75	13.00	9.50
	Argentina	1	0	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
1895	Britain	50	14	12.68	13.46	749.22	1,192.28	39.11	38.00
	India	10	4	6.15	6.95	451.83	586.33	33.25	14.33
	Argentina	6	2	6.16	6.50	283.00	477.50	14.00	7.00
Aggregate results		88	32	11.36	11.71	613.98	822.70	31.44	24.39

Sources: As for tab. 1.

was less significant in the mature phase, whereas the latter group became more so. Including bankers, solicitors, brokers, and consulting engineers increased the number of network nodes from 574 to 842. In the analysis that follows, we report the characteristics of the larger network only and note any differences as appropriate.⁴⁰

To analyse the aristocrat group further in all three countries, we distinguished between hereditary and promoted aristocrats and compared the size of the boards on which they served, the age of the firm, and the mileage of the controlled network. Table 2 shows the results. As of 1869, hereditary aristocrats were also most prominent in the UK, and there was a much larger increase in UK hereditary aristocrats relative to promoted aristocrats between 1869 and 1895. Directors with inherited titles were relatively prominent in India by 1895, but more so in absolute and relative terms in the UK in 1895. Board size did not influence the appointment of either category, but hereditary aristocrats predominated in firms that controlled smaller networks (in terms of mileage) in all three locations in 1869 and 1895. Firm age had no impact, except that hereditary aristocrats were more prevalent in older firms in India. The evidence suggests that particular types of aristocrat were not selected according to the maturity of the firm nor for purely ornamental reasons, but that promotion to the aristocracy was more likely where the firm controlled a larger rail network and for directors serving on the boards of newer firms in India.

Table 3 shows comparatives for 1869 and 1895 for each of the three aggregate network measures defined above. Over both census dates, Britain had the lowest density and degree of centrality. Argentina had the highest density and India the highest degree of centrality. These characteristic rankings persist, and are the same in 1869 and 1895. In 1869 Britain had the largest geodesic distance and Argentina the smallest. These differences reflect the relative scale of the networks. By 1895, the British network had evolved into more separated clusters of regionally concentrated networks, whereas India and Argentina, in particular, had more interconnected but distant clusters, reflected in their higher geodesic distances.

⁴⁰ Other functionaries, such as company secretaries and auditors, whose role was of a more routine administrative nature, were excluded.

Table 3. *Network overview characteristics*

Year	Country of operation	Size: total nodes	Density	Freeman degree centrality	Average geodesic distance
1869	Britain	256	0.064	0.164	2.7
	India	96	0.142	0.669	2.0
	Argentina	32	0.413	0.378	1.7
1895	Britain	226	0.066	0.144	1.7
	India	133	0.102	0.307	2.4
	Argentina	99	0.110	0.190	3.7
	Total	842			
	Average	140.333	0.149	0.309	2.3

Notes: Density of a network is the no. of connections in the network divided by the no. of possible connections, that is, $(\sum \text{degree centrality})/n(n-1)$. Freeman degree centrality in a network is defined, for a given binary network with vertices $v_1 \dots v_n$ and maximum degree centrality c_{max} , as $\sum (c_{max} - c_{(vi)}) / ((n-1)(n-2))$, where $c_{(vi)}$ is the degree centrality of vertex v_i . Geodesic distance is defined as the no. of connections edges between two nodes in the shortest path connecting them.

Sources: As for tab. 1.

Table 4. *Dominant groups*

Year	Country of operation	Dominant groups (Group exchange score)		
		Elite 1 st	Elite 2 nd	Highest non-elite
1869	Britain	Politician (0.220)	Financier (0.207)	Industrialist (0.138)
	India	Military (0.203)	Politician (0.187)	Government official (0.168)
	Argentina	Politician (0.367)	Financier (0.167)	Engineer (0.210)
1895	Britain	Aristocrat (0.395)	Politician (0.148)	Industrialist (0.095)
	India	Military (0.448)	Aristocrat (0.174)	Government official (0.077)
	Argentina	Financier (0.403)	Politician (0.153)	Lawyer (0.124)

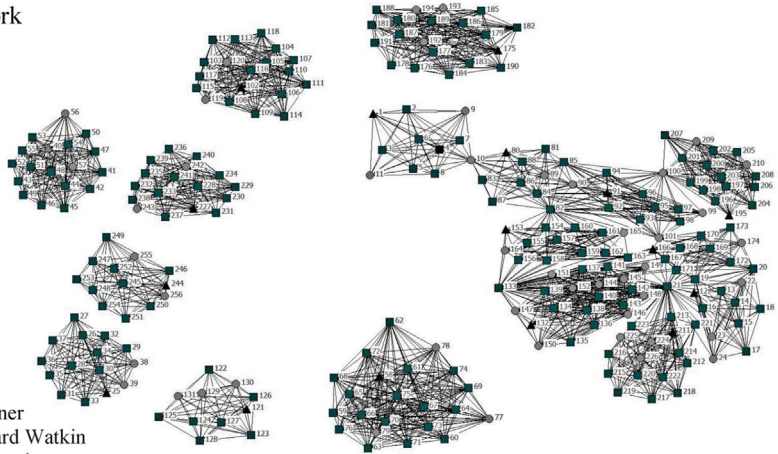
Notes: The table reports group exchange scores to identify dominance at the level of sub-group for each network. The group exchange score is defined as the no. of reciprocal ties connected to one group divided by the total no. of reciprocal ties in the network.

Sources: As for tab. 1.

Figure 2 maps all connections formed from the sample companies in each network and confirms the above pattern. To ascertain individual directors' influence, as opposed to firms or other individuals, directors are indicated as shaded squares, railway companies as triangles, and all other nodes as circles. The British network diagrams (panels A and D) are characterized by highly centralized but relatively independent clusters, whereas in India (panels B and E) clusters are less discernible, and connectivity is more evenly distributed across the network. In Argentina (panels C and F) the clusters are more decentralized and interconnected.

Figure 2 and tables 1 and 3 show the distribution of network actors, but further analysis is needed to quantify the nature of the power and influence of each group and associated individuals using the group exchange measure. Table 4 presents the

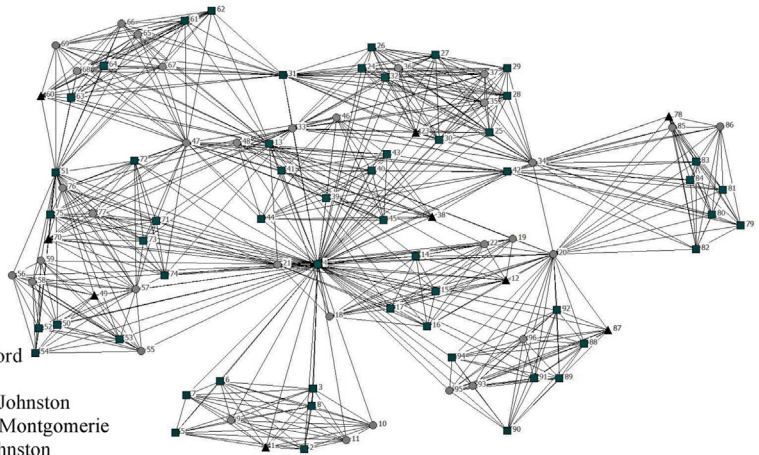
A: Britain’s 1869 network



Influential individuals:

- Node 21: Charles Henry Turner
- Node 133: Sir William Edward Watkin
- Node 187: William Henry Homby

B: India’s 1869 network



Influential individuals:

- Node 4: Juland Danvers
- Node 24: Robert Wigram Crawford
- Node 29: George Lyall
- Node 52: Captain James Gilbert Johnston
- Node 74: Lieutenant Colonel D. Montgomerie
- Node 79: Major General C.C. Johnston
- Node 91: Sir F.L. Arthur

Figure 2. Railway network diagrams [Colour figure can be viewed at wileyonlinelibrary.com]

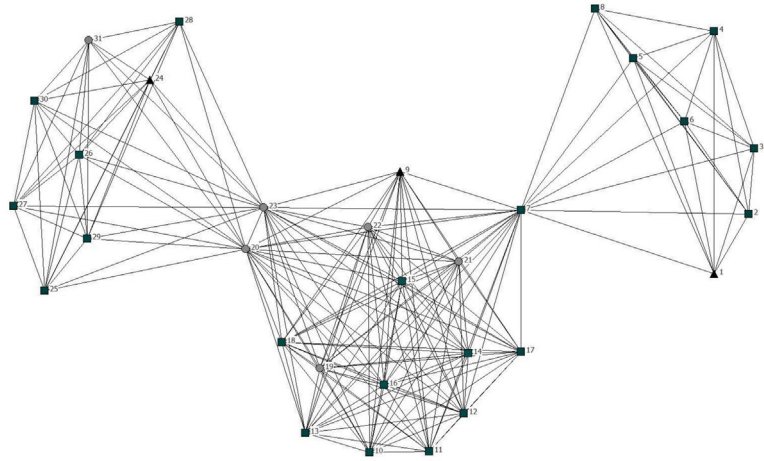
Note: Shaded squares indicate nodes representing individual directors; triangles indicate railway companies; all other nodes are circles.

Sources: As for tab. 1.

results. The group exchange scores in table 4 reveal the dominant group in each network, and figure 2 shows how the influence of the dominant group was exercised.

In Britain, a coalition of aristocrats and politicians, along with industrialists, controlled regionally concentrated but otherwise disconnected networks of influence. In India, the military was dominant in an interconnected network and projected their influence, along with Indian government officials. In Argentina, politicians and financiers dominated, along with engineers and lawyers. Some changes through time are also observable. Aristocrats were much more influential in all three networks in 1895 relative to 1869. In India, the military retained

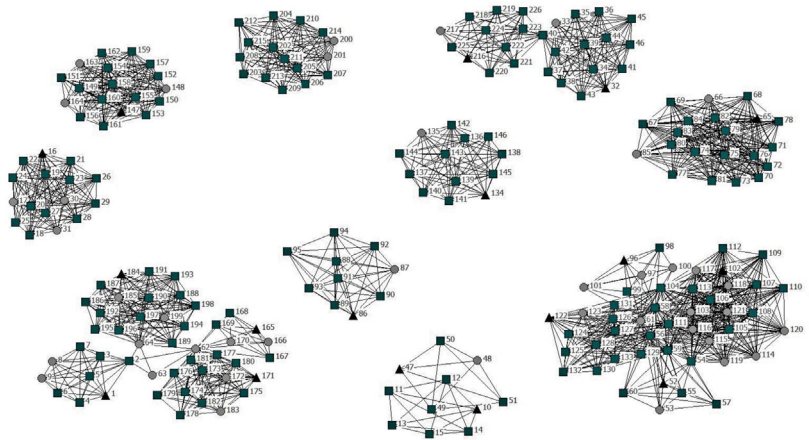
C: Argentina’s 1869 network



Influential individuals:

- Node 2: David Trail Robertson
- Node 7: Laurence Heyworth
- Node 13: Thomas Duguid
- Node 15: Samuel Waterhouse
- Node 23: Edward Woods

D: Britain’s 1895 network



Influential individuals:

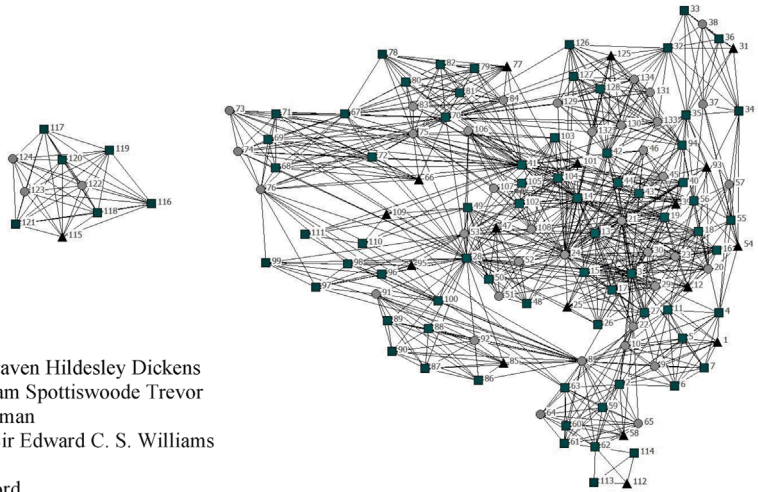
- Node 54: Henry Davis Pochin
- Node 56: John James Mellor

Figure 2. *Continued*

its dominance, but politicians and government officials lost some of their earlier influence. In Argentina, financiers overtook politicians as the dominant group at the later census date.⁴¹ We do not have data on shareholdings of railway firms country by country. However, aggregate data for 1883–1907 show that the order of preference for aristocratic investors was Empire firms first, UK firms second, and foreign firms third. Investors with military backgrounds preferred UK, then

⁴¹ A sensitivity analysis, excluding promoted aristocrats and non-director nodes, produced the same group exchange rankings for Britain and Argentina in all permutations, and for India, where the importance of aristocrats was sensitive to the exclusion of promoted aristocrats.

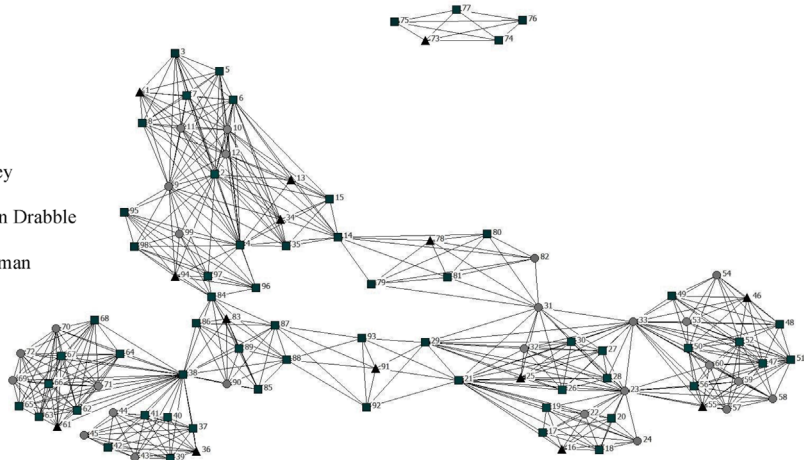
India's 1895 network



Influential individuals:

- Node 3: Lieutenant-General Craven Hildesley Dickens
- Node 14: Major-General William Spottiswoode Trevor
- Node 16: Robert Barclay Chapman
- Node 28: Lieutenant-General Sir Edward C. S. Williams
- Node 49: Sir Juland Danvers
- Node 56: Robert Leslie Crawford
- Node 62: Frederick Mytton Halliday
- Node 128: Abdul Hak, Sirdar Diler Jung UI Mulik

F: Argentina's 1895 network



Influential individuals:

- Node 2: Sir Gabriel Goldney
- Node 4: Edward Norman
- Node 50: George Wilkinson Drabble
- Node 88: O. C. Waterfield
- Node 98: Edward B. Merriman

Figure 2. *Continued*

Empire, then foreign. Financiers preferred foreign, then UK, then Empire.⁴² The trends in the aggregate data suggest that directorships in table 4 mirrored the investment preferences of that section of the elite to some degree.

We examine these relationships further using exact logistic regression analysis to predict the likelihood of elite directors sitting on the board of railways in Britain, India, or Argentina (table 5). The exact logistic regression uses a logistic function

⁴² Davis and Gallman, *Evolving financial markets*, p. 205, tab. 2.4–7; Rutterford, ‘Merchant banker’; Acheson et al., ‘Expansion’, p. 608.

Table 5. *Exact logistic regression results*

	(1) <i>Britain</i>	(2) <i>India</i>	(3) <i>Argentina</i>	(4) <i>India and Argentina</i>
<i>Panel A: Exact logistic regression results for 1869 census year</i>				
Aristocrat	2.514	0.580	0.232	0.398*
Military	0.511	3.146**	0.307	1.956
Politician	0.988	1.110	0.866	1.012
Financier	1.463	0.867	0.510	0.684
N	269	269	269	269
Chi-square	8.303*	8.773*	4.438	8.303*
<i>Panel B: Exact logistic regression results for 1895 census year</i>				
Aristocrat	1.831*	0.870	0.401**	0.546*
Military	0.239***	7.677***	0.392	4.176***
Politician	1.261	0.723	0.941	0.793
Financier	0.251***	1.572	3.241***	3.977***
N	305	305	305	305
Chi-square	44.677***	38.098***	26.517***	44.677***
<i>Panel C: Exact logistic regression results for 1869 and 1895 census years combined</i>				
Aristocrat	1.783**	0.776	0.439**	0.561**
Military	0.308***	5.486***	0.417*	3.249***
Politician	1.113	0.942	0.889	0.898
Financier	0.590**	1.187	1.849*	1.694**
N	574	574	574	574
Chi-square	36.343***	43.496***	17.259	36.343***

Notes: The table reports odds ratio for exact logistic regressions. Dependent variable in col. 1 is a 1/0 dummy variable indicating whether a director sits on the board of a railway company in Britain. Dependent variable in col. 2 is a 1/0 dummy variable indicating whether a director sits on the board of a railway company in India. Dependent variable in col. 3 is a 1/0 dummy variable indicating whether a director sits on the board of a railway company in Argentina. Independent variables are 1/0 dummies indicating whether the director is in each elite category. *** Significant at the $p < 0.01$ level. ** Significant at the $p < 0.05$ level. * Significant at the $p < 0.1$ level.

Sources: As for tab. 1.

to model binary dependent and independent variables and is more appropriate for smaller samples,⁴³ specifying the dependency of π (the probability that the binary response variable, Y , takes the value of 1) on x in the relationship:

$$\log(\pi / 1 - \pi) = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_n x_n \tag{1}$$

where $\pi = \Pr(Y = 1 | x)$ is the response probability to be modelled (with Y being a binary response variable), β is the vector of unknown regression parameters, and X is a vector of binary explanatory variables. Therefore, the likelihood function, or probability of the response is:⁴⁴

$$\pi = \Pr(y = 1 | x) = \{1 + \exp(-(\beta_0 + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_n x_n))\}^{-1} \tag{2}$$

To facilitate interpretation of the regression coefficients they are conventionally converted to the odds ratio, which is the exponential of the coefficient.

⁴³ Mehta and Patel, ‘Exact logistic regression’.

⁴⁴ Hirji, Mehta, and Patel, ‘Computing’.

In table 5, the odds ratios are mostly confirmatory of the pattern in table 4. In 1869 aristocrats were the elite group most likely to obtain a directorship of an overseas railway, but by 1895 overseas directors were much more likely to be drawn from military and financier groups, reflecting respective dominance in India and Argentina (column 4). Directors with military titles were 7.677 times more likely to feature on the boards of Indian railways. Aristocratic and military directors were less likely to appear on the boards of Argentinian railways, but financiers were 3.241 times more likely to do so. Overall aristocrats were more likely to feature on British railway boards, military directors on Indian railway boards, and financiers on Argentinian railway boards.

The analysis confirms significant differences in network characteristics, but also path dependencies, which also potentially explains why different elite groups appeared on prospectuses when British and overseas railway companies were floated on the LSE. The next three sections use further empirical evidence to explain how key individuals and institutions dominated their respective networks, thereby offering a more detailed explanation of the trends revealed by the social network analysis. Individuals are selected for further investigation on the basis of their influence in each network, measured according to betweenness score. Each country, Britain, India, and Argentina, is examined in turn.

III. Britain

The British network in 1869 was characterized by low density and low centrality (table 3). The clustering apparent in figure 2, panel A, reflects the association of directors on the boards of British railway firms in the early phase of development, with relatively few interlocks. Politicians were the most significant of the elite groups on the boards of regionally consolidated lines. Competition between networks of railway companies explains the separated pattern of regional networks that were centralized within those regions (figure 2, panel A). Financiers were significant networkers as a collective group (table 4), but there were no outstandingly well-connected individuals. Financiers were also important and industrialists were the most dominant non-elite group (tables 1 and 4).

Most prominent, in terms of network influence, were politicians Charles Henry Turner and Sir William Edward Watkin. The separated clusters of railway firms in figure 2 (panel A) were joined in only a few cases by directors with high betweenness scores, and Watkin and Turner were the leading examples.⁴⁵ Turner was MP for Liverpool and subsequently South Lancashire. In 1869, he was a director of the London, Tilbury and Southend Railway Company; the Manchester, Sheffield and Lincolnshire Railway Company (MSLR); the Great Eastern Railway Company; and the Great Northern Railway Company (GNR).⁴⁶ As a Liverpool merchant of 35 years' experience and former chairman of the Mersey Docks and Harbour Board, Turner championed the expansion of the network from Liverpool in Parliament. Rapid growth led the Liverpool business community

⁴⁵ Betweenness scores for Turner and Watkin were 2,523.58 and 1,759.43 respectively. The only other individual with a comparable score (=1,630.25) was politician Charles Gilpin (1815–75), who served on the boards of the South Eastern, Metropolitan, and Metropolitan District railways.

⁴⁶ Turner was also a director of the Tottenham and Hampstead Junction railway; *Bradshaws*, 1869.

to advocate a second Liverpool–Manchester line, promoted by the MSLR and GNR in partnership with the Midland. Crucial for Turner was the avoidance of restrictions and priorities from the already functioning London and North Western Railway Company, on which the MSLR and GNR both depended. As an MP and director, Turner provided role-based legitimacy to arguments in favour of the railway. The MSLR board deployed technical experts to marshal the facts, which opponents argued were specious, involving fabricated evidence. Nonetheless with Turner's assistance, they were sufficient to 'make a parliamentary case'.⁴⁷

The only other prominent individual was Watkin, a promoted aristocrat, and widely acknowledged in the literature.⁴⁸ A notable feature of the present analysis, however, is how, like Turner, but unlike most other contemporary railway directors, Watkin interlocked through multiple directorships. Their positions reflected regional interests but also spanned regions by virtue of the interlocks. Moreover, Watkin interlocked with several boards that also featured Turner: the Great Eastern, the MSLR, the Great Western and South Eastern Railway Companies. Watkin also served north-western and south-eastern constituencies and, as a Cheshire MP and later high sheriff of Cheshire, was instrumental in the development of the Liverpool–Manchester connection, alongside Turner in negotiations that finally resulted in the second line in 1877.⁴⁹

Although Watkin had achieved aristocratic status by 1869, he was from relatively humble origins and reflected the priorities of industrialists. As Turner represented the Liverpool interest, so Watkin had associations with Manchester-centred industrialists influential in the development of the early northern network. Industrialists were influential by simultaneously being railway directors and politicians themselves, for example, William Henry Hornby, Conservative MP and cotton industrialist with interests in Blackburn and Manchester, who served as a director of the Lancashire and Yorkshire Railway,⁵⁰ or through connections to other directors who were politicians. Links to individuals like Watkin facilitated the expansion of the railway network to their advantage, as in the case of Edward Tootal, of the Manchester cotton firm Atkinson and Tootal. Watkin, therefore, illustrates how powerful local industrialists were able to use the political system to facilitate the expansion of the railway network.⁵¹

Network features remained constant in terms of centrality and density while aristocrats became more decisively the dominant group by 1895. There were more aristocratic directors, but politicians and total elite had diminished and so too had industrialists (table 1). Gourvish notes that the boards of most mainline companies featured knighted executives, but not until after 1890.⁵² Our data show that whereas promoted aristocrats were more significant numerically, rising from 10 to 14, they were relatively less important compared to hereditary aristocrats. Promoted aristocrats accounted for 34.5 per cent of aristocrats in 1869, falling to

⁴⁷ *Manchester Sheffield and Lincolnshire Railway (extension, &c) Bill* (P.P. 1865, CXX), ev. Turner, pp. 29–31.

⁴⁸ Gourvish, 'Performance'.

⁴⁹ Watkin was knighted in 1868 for services in Canada and was not a serving MP in 1869; 'Sir Edward William Watkin', *Oxford Dictionary of National Biography*, <https://www.oxforddnb.com> (accessed June 2020).

⁵⁰ Hodgkins, *Diary*. On Hornby's industrial and political influence, see 'Grand Conservative demonstration', *Blackburn Standard*, 14 Sept. 1853; *Bradshaw's*, 1855.

⁵¹ Hodgkins, *Diary*.

⁵² Gourvish, 'British business elite', pp. 308–9. For example, eight out of 19 directors on the board of the Great Western Railway in 1895 were aristocrats; *Bradshaw's*, 1895.

21.8 per cent in 1895. Politicians remained significant, but less so compared to 1869. A possible reason is that railway construction was less politically contested than in the 1840s, 1850s, and 1860s.⁵³ Industrialists' direct involvement secured networks that could serve regional business interests, which dissipated once the major features of the network were in place. The three main categories of dominant elite—aristocrats, politicians, and industrialists—served on boards of one railway only, commonly the one most closely aligned with broader business interests. The clusters in figure 2, panel D, therefore, represent regional networks controlled by separate elite groups of industrialists. They achieved status by winning elections and promotion to the aristocracy, and were increasingly complemented by aristocrats with hereditary status.

The role of interlocked directors had also diminished compared to the 1869 network. With maturity, there were fewer new projects, and thus less competition between business groups to secure development of convenient lines. In 1895, only a few new projects were necessary to complete what was soon to become the full extent of the network, the most notable of which was the Great Central Railway. The project accounted for the significant interlocks between directors, which, as in 1869, were centred on Watkin. In 1895, Watkin was the only aristocrat still present on multiple boards. These were the Metropolitan, the South Eastern, the MSLR, and East London Railways, fewer than in 1869, as reflected by a lower betweenness score.⁵⁴ The only other directors with non-zero betweenness scores who were also politicians or industrialists were John James Mellor and Henry Davis Pochin.⁵⁵ Mellor, a cotton industrialist by background, became an MP in 1895 when he was also director of the South Eastern and Metropolitan railway companies. Mellor was also Watkin's brother-in-law,⁵⁶ and they collaborated on abortive projects for a Channel Tunnel and an Eiffel Tower-type project (planned for a site close to the London terminals of the Metropolitan and South Eastern Railway terminals at Cannon Street).⁵⁷ Crucially, Mellor was chairman of the Ways and Means Committee in the House of Commons, and able to influence how the proposed expansion of the MSLR railway into London might affect the Tower Company's project.⁵⁸

Another notable director in the Watkin network was Henry Davis Pochin, director of the MSLR and chairman of the Metropolitan Railway. Pochin was an industrial chemist and held directorships in several large industrial and engineering firms: Bolckow Vaughan, John Brown & Co. Staveley Coal and Iron, and Sheepbridge. He was also a director of the Watkin's Tower Company.⁵⁹ By virtue of his directorships, Pochin was well placed to ensure a beneficial outcome for both companies. The Metropolitan Railway held surplus lands in London, which Pochin could use within his network. Some of them were let to the Tower Company

⁵³ Alderman, *Railway interest*.

⁵⁴ 591.0 compared to 1,759.43.

⁵⁵ John James Mellor = 99.60 and Henry Davis Pochin = 30.00.

⁵⁶ Jackson, *London's Metropolitan Railway*, p. 153.

⁵⁷ 'The Channel Tunnel', *Standard*, 17 Dec. 1886; 'Watkin's "folly"', *Financial Times*, 24 Aug. 1889; 'Wembley Park Tower', *Financial Times*, 16 May 1896.

⁵⁸ 'Manchester, Sheffield and Lincolnshire Railway', *Sheffield Independent*, 5 July 1895. Following expansion to London, the company became the Great Central Railway in 1898; Vanns, *Great Central Railway*.

⁵⁹ 'Obituary', *Nottingham Evening Post*, 30 Oct. 1895.

and the rest were held in expectation of increases in price when the MSLR reached London and needed sites for stations and other purposes.⁶⁰

In summary, regional elites of aristocrats, politicians, and industrialists dominated the boards of British railways in the late nineteenth century. Aristocrats and politicians were commonly industrialists in their earlier careers. Other groups, including lawyers and engineers, were less dominant in the British network, and financiers declined in importance. Lawson, a contemporary observer, was thus correct when he noted that compared to their German and American counterparts, British firms lacked technical and scientific understanding and relied on trust, although were otherwise secretive, resisting shareholder and legislative scrutiny.⁶¹ Also, directors formed business groups through interlocks using role legitimacy to exercise political influence to secure network improvements favourable to their business interests, more so in 1869 than in 1895.

IV. India

In 1869 more than 90 per cent of shareholders in major Indian railways were British, and almost all the capital was equity. Shareholders were represented by a board of directors in London, which included the heads of British companies with interests in India, retired members of the British military, and members of the British financial elite.⁶² The evidence in table 4 confirms that military directors were the dominant group on the boards of Indian railway companies. Unlike the regional clustering of director networks in the British system, connections in the Indian network were more evenly distributed.

Individually, military directors were numerous and populated most boards extensively, but did not typically hold multiple positions. Directorships accordingly represented the strategic interests of the military as a collective group, rather than through specifically influential individuals. Seven out of nine companies in 1869 featured military directors, reflecting the location of their earlier military service. For example, Lieutenant Colonel D. Montgomerie, a retired officer of Madras, served on the board of the Madras Railway Company. Colonel Sir F. L. Arthur, who served in Bombay later, became a director of the Scinde Railway Company.⁶³ Others had military engineering backgrounds; for example, Major-General C. C. Johnston of the Oudh and Rohilkhand Railway (ORR) and Captain James Gilbert Johnston of the Madras Engineers, subsequently director of the Great Southern Railway of India (GSRI).⁶⁴

Politicians were also prominent as a group in the early Indian network (table 4). Significant individuals included MPs Robert Wigram Crawford and George Lyall, who served on the board of the East Indian Railway Company (EIRC). Crawford and Lyall combined expertise and influence as MPs with experience as merchants

⁶⁰ 'The Metropolitan Railway', *London Standard*, 28 Jan. 1893.

⁶¹ Lawson, *British railways*, pp. 223–5.

⁶² Mukherjee, *Early history*.

⁶³ India Office, *Indian Army and Civil Service List*, p. 269; *Asiatic Journal and Monthly Miscellany*, vol. 38, May–Aug. 1842, p. 400.

⁶⁴ *Indian News and Chronicle of Eastern Affairs*, 2 Jan. 1851, p. 562; *Gentleman's Magazine*, vol. 31, Jan.–June 1849, p. 312. The GSRI was the main route in the Madras Presidency.

in Bombay and the East India Company (EIC) respectively.⁶⁵ As with military directors, politicians tended to specialize in their firms rather than extending interlocking ties across the network.⁶⁶

A third influential group, with a somewhat different pattern of influence, were government officials. A government of India representative, appointed by the secretary of state, sat on company boards and had the authority to veto decisions.⁶⁷ Juland Danvers served on the boards of seven out of eight mainline railways as government director of Indian railway companies and secretary of the Public Works Department.⁶⁸ He began his career with the EIC in 1842 and became government director in 1861, as an India Office civil servant. Based in London, he nonetheless had by far the highest degree and betweenness centrality scores and can easily be discerned in figure 2, panel B.⁶⁹ Danvers's influence over railway policy as a civil servant reflected the strategic reasons for military directors dominating individual boards. In 1877, he noted how railways were used for military control, allowing for 'military force to be moved with ease and expedition', to undermine the power of local potentates, and to provide famine relief to distressed areas.⁷⁰

The evolution of Indian railways between the census dates reflected competing interests between the Indian government and London-based private investors. Most mainline firms resolved these through contract renegotiation involving debt cancellation, new profit-sharing arrangements based on lower rates of guarantee, and delineation of operating responsibilities. The result was a system in which the Indian state structure retained a dominant influence.⁷¹ The role and resource legitimacy of the dominant military and government officials contributed to more effective planning and control of the physical network at a lower cost.

Military influence, backed by state officials, was therefore crucial in the early years of the network, and by 1895 this position had consolidated further. Some influential military directors had civil service and engineering backgrounds, such as Major-General William Spottiswoode Trevor and Lieutenant-General Sir Edward C. S. Williams, both of the Royal Engineers.⁷² Lieutenant-General Craven Hildesley Dickens was director of the Assam Bengal, the Bengal and North Western (BNW), the Bengal Central, the Bengal Nagpur, Bombay and the Baroda, and Central India railway companies. Since 1861, Dickens had been secretary to the Government of India Public Works Department and involved in the construction of railway infrastructure and irrigation works. He developed expertise in the financing of the railway network, state involvement, and the guarantee system. In doing so, Dickens and others distinguished between lines required for military purposes and purely commercial lines, and the associated methods of financing. Dickens, and others, also noted the value of the railway network in reducing the risk posed by

⁶⁵ *Observer*, 8 Dec. 1851, p. 8 and 19 Apr. 1868, p. 2; Lyall obituary, *Bankers' Magazine*, 1881, vol. 41, p. 940.

⁶⁶ Individual military and political directors all had relatively low degree centrality and betweenness scores.

⁶⁷ Bogart and Chaudhary, 'Regulation'.

⁶⁸ The exception was the ORR where the equivalent was the EIC representative, William Dent; 'Colonial and foreign', *Observer*, 4 Aug. 1861, p. 3; 'Memorial notices', *Manchester Guardian*, 21 Oct. 1902.

⁶⁹ Betweenness score = 5,319.40.

⁷⁰ Danvers, 'Indian railways', p. 269.

⁷¹ Kerr, *Engines of change*, pp. 77–8.

⁷² Marriott and Mukhopadhyay, *Britain*, p. 445; India Office, *India List and India Office List*, pp. 632, 647; *Bradshaw's*, 1895.

famines.⁷³ Such expertise was crucial, not just for state financial decisions regarding railways, but also to identify which lines had potential for flotation on the LSE.

As table 4 shows, aristocrats had overtaken politicians as the second most dominant group, although the discontinuity was more apparent than real. Indeed increased aristocratic representation reflected the continued influence of Indian state actors. Many of these directors acquired aristocratic titles, following the Indian government's policy of creating a class of titled individuals through a new honours system, based around the Order of the Star of India and the Order of the Indian Empire.⁷⁴ Such honours were conferred on directors with a prior military record or with senior administrative roles in the Indian Civil Service. For example, Robert Barclay Chapman, Companion of the Star of India of the Bengal Civil Service and former financial secretary to the government of India, was by 1895 a director of the BNW.⁷⁵

Government officials more generally remained the most influential non-elite category. Frederick M. Halliday, director of the EIRC and the Barsi Light Railway, had a career in the Bengal Civil Service. Robert Leslie Crawford, former accountant general of the Public Works Department, Government of India, was director of one company and accountant for another. Juland Danvers, now Sir Juland and Knight Commander of the Star of India, remained influential, although relatively less so compared to 1869.⁷⁶

The evidence reveals a close network of significant individuals combining military/state backgrounds. Aristocratic designations were an outcome of these roles and conferred on most of the leading individuals in the network. Like civil servants, military directors also gained admission to the Indian aristocracy.⁷⁷ At some point in their careers, therefore, most of the dominant individuals fell into at least two of the military, state, or aristocratic groups, and often all three, suggesting they were part of a cohesive Indian elite. Throughout the second half of the nineteenth century, military threats and famine relief necessitated state involvement and also required expertise to administer and value the commercial elements of the networks.

V. Argentina

In Argentina in 1869, certain dominant individuals underpinned the high degree of network density, but the whole network was dispersed compared to India, as the lower average degree centrality indicates (table 3). Compared to Britain and India, the Argentine network was smaller, and only a fraction of the system had been built by 1869. Between 1861 and 1865 British entrepreneurs using British capital organized several railway companies in Argentina, including the Central Argentine

⁷³ *S.C. on East India* (P.P. 1878, CLXV), ev. Dickens, pp. 1–72; *ibid.*, ev. Northbrook, p. 85.

⁷⁴ The new Orders were established in 1861 and 1877 respectively; *Notes and Queries*, vol. s2-XII, no. 298, 14 Sept. 1861, p. 208; *The Graphic*, 24 Aug. 1878, p. 202.

⁷⁵ Hunter, *Life*, p. 5.

⁷⁶ Crawford was involved with the Delhi Umballa and Kalka Railway Company and the South Mahratta Railway Company. Danvers held seven directorships in Indian railway companies in 1869 and two in 1895. *Bradshaw's*, 1869 and 1895.

⁷⁷ Dickens and Trevor, Companion of the Star of India (CSI); Williams, Knight Commander of the Indian Empire.

Railway (CAR) and the Buenos Aires and Great Southern Railway (BAGSR), with financial support from the Bank of London and the River Plate (BLRP).⁷⁸

Dominant individuals in the network of 1869 were politicians and financiers. Politicians' role legitimacy offered the necessary negotiating expertise to overcome the objections of the Argentine political establishment.⁷⁹ Dominant politicians included Samuel Waterhouse MP, director of the Great Northern Railway Company and the CAR. Waterhouse's commercial interest in Argentina derived from his Halifax-based family textile firms, Waterhouse & Co. and Rawson & Saltmarshe, exporters to Latin America from the 1830s.⁸⁰ The Heyworths, father and son, both Lawrence, in 1869 were respectively directors of the CAR and the BAGSR, and Edward Woods was consulting engineer for the CAR and Buenos Ayres and Ensenada Port railways.⁸¹ Heyworth Senior, a Liverpool merchant with substantial experience of Latin American trade, disposed of his overseas interests in 1836 to concentrate on railways and a political career, becoming an MP in 1848.⁸²

Given the small scale and low centrality of the network, involvement with the CAR was the strongest predictor of broader influence. Direct interlocks were rare, and Woods and the Heyworths were influential as intermediaries between disparate clusters. Like the Heyworths, Thomas Duguid, another significant director of the CAR, owed his position to the earlier activities of a family mercantile business, Duguid, Holland & Co. and dealings with Barings, whose influence in Argentina was increasing significantly.⁸³ Heyworth Junior and Duguid used their inherited expertise and contacts in trading networks to exploit the opportunities offered by the interior and well-connected cities via the CAR.⁸⁴ Barings meanwhile financed national and state governments and provided loans for the railway network. David Trail Robertson, MP and chairman of the BAGSR, also a director of Barings, supported prominent financier Norberto de la Riestra, who facilitated negotiations between British merchants and the Argentine government.⁸⁵

Politician directors' role legitimacy was underpinned by legal expertise. The large majority of Argentine railway director MPs had legal backgrounds. These MPs also offered connections to other relevant expertise (consulting engineers) and to merchant banks. British experts influenced Argentina's land laws following the Rosas period (1829–52), which created concentrated landholdings by Presidential decree.⁸⁶ The CAR was effectively run from London but attracted local investment through an associated company, the Central Argentine Land Company, run for the benefit of resident British landowners. To assist them, local boards shadowed

⁷⁸ *Bradshaw's*, 1869.

⁷⁹ Ferns, 'Investment and trade'.

⁸⁰ Llorca-Jaña, *British textile trade*, pp. 120–1.

⁸¹ *Bradshaw's*, 1869, pp. 406–7. Later volumes of *Bradshaw's* show that Heyworth junior succeeded his father as director of the CAR until his death in 1903. Woods was also involved in the Andino Railway and Northern line; Chrimes, 'Civil engineers', p. 688.

⁸² Heyworth retired as an MP in 1857, but continued political campaigns into the 1860s; Newbigging, *Forest of Rossendale*, pp. 245–8; Webb, *My apprenticeship*.

⁸³ Reber, *British mercantile houses*, p. 108; Barings Archive, London, House Correspondence Buenos Aires, HC4/4.1.4, letters from T. Duguid, 1827–30.

⁸⁴ Individual degree centrality measures of the individuals referred to were Waterhouse: 15, Woods: 23, Heyworth snr: 8, Heyworth junior: 16, and Duguid: 15.

⁸⁵ Rock, *British*, p. 118.

⁸⁶ Weaver, *Great land rush*.

London boards to resolve disputes with governments.⁸⁷ A significant investment group centred on Walter Morrison, an MP and director of CAR, whose board featured three lawyers, the River Plate Trust, Loan, and Agency Company (RPTLAC), the Mercantile Bank of the River Plate, and the law firm of Ashurst, Morris and Crisp. Between 1882 and 1888, the RPTLAC acquired managing agencies for the East Argentine, Central Cordoba, and Rosario and Cordoba Railways, and was involved in renegotiating provincial Argentine debts after the Barings crisis.⁸⁸

By 1895, these individuals and relationships were complemented by new networks of influence. Table 4 shows that the dominant groups were now financiers and politicians and that lawyers, reflecting their continuing influence in Morrison's group, were now the most influential non-elite group. Financiers were dominant in numerical terms and by influence as measured by the group exchange score. Although more numerous than politicians, aristocrats had a lower score, indicating that they tended to sit on single boards rather than holding multiple directorships.

Dominant individual financiers exemplified the characteristics of the 1895 network. Gabriel Goldney, director of Capital and Counties Bank, along with Edward Norman of Martins, were directors of Bahia Blanca and North Western and Villa Maria and Rufino (VMR) railways. Norman and his colleague and chairman of the same bank, Edward B. Merriman, were directors of the Cordoba Central Buenos Ayres Extension Railway Company.⁸⁹ Norman's father, George Warde Norman, was a partner with Barings and director of the Bank of England. Goldney served as director of two Argentine railway companies included in the sample and several other railway firms besides.⁹⁰ He had an aristocratic background and served as an MP until 1885. He was also a banker with a record of pernicious lending practices,⁹¹ which was his principal role in 1895. He was involved with the Bahia Blanca and North Eastern Railway Company, floated in 1891 in the wake of the Barings crisis, and the VMR, based on profit guarantees from the Argentine government, which it subsequently failed to honour.⁹²

A further important network was led by innovator and financier George Wilkinson Drabble and the banking firm Morton Rose. Drabble was chairman of the BLRP, the Buenos Ayres and Rosario Railway, the BAGSR, and the Buenos Ayres Western Railway (BAWR), plus several railways in Uruguay.⁹³ He was also the first British merchant to capitalize on the invention of meat refrigeration export from Argentina.⁹⁴ Morton Rose was established by Levi Parsons Morton in 1863 and Sir John Rose, a lawyer and colonial administrator who had served as an MP in the Canadian Parliament and as solicitor general of Canada and Minister of Public Works. On his return to England in 1869, he became a partner in Morton Rose and

⁸⁷ Lewis, 'Britain', pp. 109–10.

⁸⁸ Jones, 'Great capitalists', pp. 159–60.

⁸⁹ Betweenness scores for these individuals were Goldney: 337.70, Norman: 337.70, and Merriman: 104.81.

⁹⁰ Goldney's obituary lists his directorships: Bahia Blanca and North Western Railway, Buenos Ayres and Pacific Railway, Capital and Counties Bank, the Cordova Central Railway, the London Life Association, and the VMR; *Financial Times*, 10 May 1900, p. 5.

⁹¹ Grossman and Imai, 'Taking the lord's name', p. 86.

⁹² Lewis, 'Britain', pp. 118–20; 'It was not a cheerful tale', *Financial Times*, 11 June 1895.

⁹³ Cassis, *City bankers*, p. 169.

⁹⁴ Švepeš, 'Ways', p. 78.

later the London and Westminster Bank.⁹⁵ Morton Rose had an active investment interest in the Transandine Railway, the BAWR, and the Cordova and North Western Railway. Directors of the first two of these firms respectively included financiers O. C. Waterfield (Transandine) of the Imperial and Ottoman Bank, and Rose and Drabble (BAWR).

In summary, from 1870 onwards, there were three significant investment groups: first, the Morrison and Morris group centred on the RPTLAC and Ashurst & Co.; second, a group of investment bankers based around Goldney and Norman; and third, the Morton Rose group based around Drabble and Waterfield and associated investment banks. There were significant crossovers between these groups, within a larger network dominated by financiers and politicians. The Argentine case shows that MPs, typically lawyers by background,⁹⁶ as railway company directors, provided experience with negotiating concessions from the Argentine political establishment and navigating extension bills through the British Parliament. Politicians and financiers therefore respectively provided the role and resource legitimacy required to secure the expansion of the rail network.

VI. Conclusions

Comparing the evidence across the three networks suggests local circumstances dictated substantially different reasons for the inclusion of elite directors on the boards of London-quoted railway companies. British railways were developed according to the priorities of regional industrial groups, whose members admitted politicians to secure the relevant permissions or resolve battles over competing lines. Hereditary aristocrats increasingly dominated their boards, supplemented by early network developers who were promoted to the peerage alongside successful industrialists.

In India, military control substantially explained board composition, which reflected the power of civil servants, military engineers, and military commanders. All three of these groups were promoted through the fledgling Indian aristocracy in the later nineteenth century. British and Indian railways thus evolved aristocratic boards, albeit for different reasons.

Outside the Empire, the Argentine case illustrates how groups based around merchants coopted politicians, often with legal backgrounds, to negotiate access and concessions. In this sense, the early phase of the Argentine network resembled the British one. As the Argentine network developed, however, unlike in Britain and India, financiers became increasingly dominant. Their emergence reflected the transition of merchant houses into banks and financial houses organizing investment groups, backed by politicians with legal backgrounds who could assist in contractual negotiations with national and state governments.

In the face of this evidence, it is difficult to sustain the view that directors were recruited at the initial public offering stage purely for reasons associated with successful stock market flotations. Rather, board memberships reflected deep-rooted and longer-run processes of engagement between railway companies and

⁹⁵ 'The death of Sir John Rose', *The Times*, 27 Aug. 1888, p. 9.

⁹⁶ Lawyers were also more prominent across other industries with MP directors: Braggion and Moore, 'Economic benefits', tab. 2, p. 150, shows that lawyer was the most common background for MPs holding directorships.

local institutions of control. The elite evolved into role and resource functions of board membership and, in the case of the aristocracy, away from the premodern functions based on reputation and trust.

Directors may have nonetheless performed the functions identified in the finance literature, including accessing capital and signalling the quality of issues. It is undoubtedly the case that directors with hereditary titles figured prominently on the boards of UK firms and became more prominent towards the end of the nineteenth century. If aristocrats were recruited for ornamental purposes, it was more likely to be on the boards of British firms. In India aristocratic recruitment and promotion reflected the role of railway infrastructure in the state-building process, and aristocrats were relatively unimportant throughout in Argentina. Even in Britain, however, it is noteworthy that hereditary peers were more closely associated with smaller and older railways, which had relatively lower requirements for new capital.

The patterns of board membership in the three jurisdictions considered here offer general support for the role and resource functions of elite directors. In Britain, India, and Argentina, the backgrounds of individuals, as industrialists, military and civil servants, and as legal and financial experts respectively, had a substantial impact on board composition. Through interlocks, they were able to access the influence and the financial resources needed to develop further and sustain physical railway infrastructure.

However, the evidence in this article is drawn from only railways and then in only three contrasting geographical locations. More research could extend the analysis beyond railways, or consider railways established elsewhere in this period that were financed from London. Nevertheless, the contrasting functionalities of directors in the three locations suggest organic reasons for the heterogeneous representation of elites on London-quoted railway companies. For this crucial sector at least, British expansion in the late nineteenth century, of the domestic industrial and commercial base, of its strategic imperial interests, and of its overseas commercial interests, also facilitated the expansion and co-existence of industrial, military, and financial elites.

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