Investor reactions to legislative liberalization and the run-up in British share prices, 1844 to 1845

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We study the association of shareholder returns with liberalization in government policy during Britain's railway run-up of 1844–5. The findings sustain two main claims. First, the railway returns during the run-up were associated with the advent of liberalizing policies, especially related to free trade, enhanced transparency and governance of firms, and industry consolidation. Second, analysis of cross-sectional variation reveals higher returns to large railways in the South and Midlands of England, several of which were leading consolidators. This study is the first to report an association between policy liberalization and run-up returns and to identify consolidators as the prime beneficiaries of the liberalization.

Keywords: run-up, bubble, railway mania, returns, liberalization

JEL classification: C58, D72, N23, N43, P12

I

Equity market run-ups figure prominently in financial history. Britain's run-up of 1844–5 coincided with a fundamental change in the government's economic policy paradigm. For more than 200 years, the government had enforced a program of market, price, trade and labor controls in various industries. However, between 1844 and mid 1845, a growing liberalization movement led Parliament to

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debate and enact new laws regarding corporate formation, governance, financial reporting, rate of return regulations, standards for railway service, railway industrial organization and free trade. This wave of legislation heralded a liberal economic paradigm in British government policy that would last through the Victorian era and beyond. Did Britain's economic liberalization contribute to the run-up in British railway share prices in the mid 1840s?

Previous research has shown that economic liberalization of government policy can influence macroeconomic performance and equity prices (Roberts 1990; Landes 1998; Henry 2000, 2007, p. 887; Fuchs-Schundeln and Funke 2003; Leblang and Mukherjee 2005; Bernanke and Kuttner 2005; Fuss and Bechtel 2008; Acemoglu and Robinson 2012). Yet prior research on the impact of policy changes has given less attention to their possible association with equity market run-ups.

Britain's railway mania offers a prominent opportunity to test the association of liberalizing legislation with the run-up. A contemporary writer described the 'mania' as the 'greatest example in British history of the infatuation of the people for commercial gambling' (Mackay [1841] 1980, p. 88). Karl Marx and Friedrich Engels (1850) believed that the railway 'mania' and subsequent commercial crisis were so significant that they would ignite communist revolution across Europe. Chancellor (1999) and Quinn and Turner (2020) indirectly linked liberalization with the market run-up, arguing that deficient market supervision was responsible for the 1844–5 run-up and subsequent crash. We complement these explanations for the run-up with the hypothesis that new government policy prompted a revision in investor expectations owing to perceptions of higher transparency and efficiency, better governance, free trade and gains from system consolidation.

This study tests for a possible association between the advent of liberalizing legislation and returns to shareholders during the run-up. It complements previous research on asset price run-ups in general (e.g. Eleswarapu and Reinganum 2004; Kiley 2004; Barbarino and Jovanovic 2007; Fama 2014; Greenwood, Shleifer and You 2019; Greenwood *et al.* 2020; Bordalo *et al.* 2021), and specifically on Britain's railway run-up of 1844–5 (e.g. Bailey 2004; Campbell 2009; Campbell and Turner 2010, 2012; Odlyzko 2010; Campbell, Turner and Walker 2012).

Using a hand-collected database of legislative, monetary and commodity events, we study 18 event episodes of enactments or debates about corporate governance, corporate formation, railway industry structure and free trade and find that several were associated with positive and significant event returns. We present the first evidence of the significant association of liberalizing legislation with equity market returns during the market run-up from 1 January 1844 to the peak on 9 August 1845. These event-related returns constitute a material portion of the entire market run-up, and account for 58.7 percent of the run-up in railway stocks and 46.2 percent for the market portfolio. News events about new liberal economic legislation are associated almost universally with positive shareholder returns. In addition, we find that higher event returns accrue to large railways in England's South and Midlands regions, many of whom were active consolidators. These results suggest a

new view of the run-up, that it was advanced significantly by policy liberalization, elements of which encouraged consolidation of the railway industry into a few national systems.

Our discussion proceeds as follows. Section II places this study in the context of previous research on the relationship between market run-ups and government liberalization and Britain's railway run-up of 1844–5. Section III describes the equity market run-up and six legislative innovations aimed at the liberalization of economic activity. This section discusses why these policies plausibly affected investor expectations. Section IV presents our methodological approach, including hypotheses and tests. Section V surveys the analytic findings for the entire sample. Section VI reviews findings for the railway sector as segmented by size and region. Finally, Section VII concludes with a summary of the findings and offers implications for future research.

II

Prior research has identified at least three contributing factors in equity market run-ups. First, large run-ups have been associated with economic displacements such as the dissemination of novel technologies such as steam-driven railways in the mid nineteenth century, electrification of factories and households in the 1920s, and widespread commercial internet access in 1998–2000 (Jovanovic and Rousseau 2000; Nicholas 2008; Pastor and Veronesi 2009; Bruner and Miller 2019).

Second, credit and money supply expansions are associated with speculative activity and the likelihood of run-up in asset prices (Gayer *et al.* 1953; Friedman and Schwartz 1963; Kindleberger 1978; Wicker 2015). Ball and Holt (1998) and Holt (2019) survey experimental results showing that credit expansions are associated with a greater propensity toward trading shares above fundamental values.

Third, run-ups have been associated with 'hot market' sentiment (Shiller 2000, 2008, 2019; Jovanovic and Rousseau 2002; Helwege and Liang 2004; Derrien 2005; Khanna, Noe and Sonti 2005; Bruner, Chaplinsky and Ramchand 2006; Ljungqvist *et al.* 2006; Rosen 2006; Doukas, Guo and Zhou 2011; Hanselaar, Stulz and Van Dijk 2019; Botsari and Meeks 2018) and 'new era' narratives (Evans [1849] 1969; Allen 1931; Galbraith 1954). Dufwenberg, Lindqvist and Moore (2005) report experimental results finding that a higher proportion of inexperienced traders in a market is associated with a greater propensity toward bubble formation.

We explore a fourth possible stimulus to a run-up: legislation that liberalizes economic activity and prompts an upward revision in investor expectations. Prior research shows an association between liberalizing policy changes and macroeconomic outcomes such as higher GDP growth and trade and lower capital costs that could raise expected returns to investors and, therefore, stock prices (Landes 1998; Bekaert, Harvey and Lundblad 2001; Giavazzi and Tabellini 2004; Tornell, Westermann and Martinez 2004; Henry 2007; Fuss and Bechtel 2008; Acemoglu and Robinson 2012; Irwin 2019). Several studies have reported a direct association between equity returns and policy surprises such as market liberalization (Roberts 1990; Dowdell,

Govindaraj and Jain 1992; Henry 2000; Fuchs-Schundeln and Funke 2003; Bernanke and Kuttner 2005; Leblang and Mukherjee 2005; Loayza, Ouazad and Rancière 2018). Economic liberalization has coincided with other prominent market run-ups, including the Mississippi and South Sea Bubbles of 1720 (Bruner and Miller 2019), the run-up in bank stocks in 1791 (Miller 2018), and the dot-com boom of 1998–2000 (Caballero, Farhi and Hammour 2006; Kraay and Ventura 2007).

Research on Britain's railway run-up of 1844–5 documents high equity returns associated with initial public offerings of new railway companies, dividend payments, and leveraged purchase plans (Campbell 2009; Campbell and Turner 2010, 2012, 2015; Campbell, Turner and Walker 2012). Odlyzko (2010) illuminates the detachment of share prices from fundamental factors such as capital investment, traffic volume and profits. These studies highlight the acute sensitivity of shareholder returns during this time to investor expectations and the influences that shaped them. Chancellor (1999, pp. 122–3) attributes the run-up to disruptive new technology, raising investor expectations for high returns. He cites the Railway Act of 1844 as a stimulus but also blames the government's lack of constraint on speculation for the boom. Quinn and Turner (2020, p. 71) also cite the Railway Act as 'the spark that ignited the bubble'. Instead of mechanical technology, Quinn and Turner argue that a governmental innovation like the Railway Board that would integrate the system and promote profitable network externalities drove speculation. This study complements this prior research by adding empirical findings regarding the association of liberalizing legislation with equity returns during the run-up.

III

Figure 1 presents a graph of the cumulative value-weighted return to shareholders for our sample of 100 equities traded on the London Stock Exchange and its component industrial sectors in railways, banks, insurance, metals, shipping and trade. The vertical shaded lines in the figure depict days on which news about liberalizing legislation arrived. These event days aggregate into 18 episodes of adjacent days and cover the periods in which Parliament considered six major liberalizing initiatives (more about these below). We hypothesize that news of liberalizing events raised investor expectations about future returns.

The run-up began in 1844 after a recession that ended in 1843[1] (Beveridge 1940; Gayer, Rostow and Schwartz 1953, pp. 639 and 671). Our study begins at 1 January 1844. The mileage of new railway lines authorized by Parliament surged from 90 in 1843 to 810 in 1844 and 2,816 in 1845. Our diverse sample of equity securities peaked on 9 August 1845, which is the end date for this study.

Figure 1 reveals that the railway sector led the return run-up, followed by the shipping and trade sectors. The metals sector saw an initial surge in returns, which began

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[1] 'Railways as a permanent investment', *The Economist*, 18 Nov. 1848, pp. 1297–9.
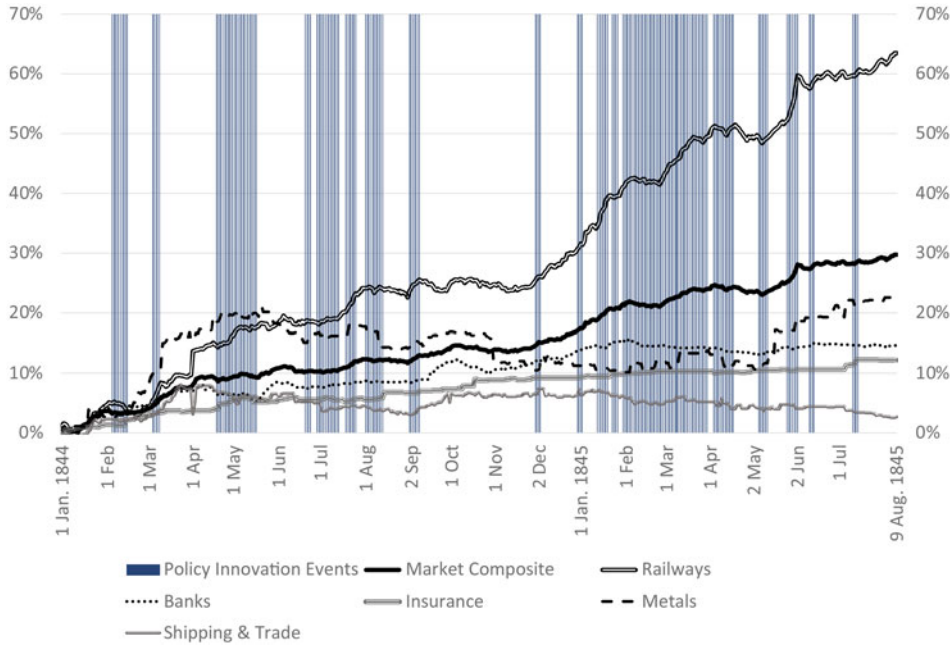
Figure 1. *Run-up 1844 – August 1845: cumulative returns for the market composite and five sectors with policy innovation events in Parliament*
Source: Authors' figure, based on data from Global Financial Data, Hansard (*Parliamentary Debates*), the Bank of England historical database, *The London Gazette*, *The Times*, *Course of the Exchange*, *The Economist*, and archival records of Rothschild & Co. and Barings Bank.

to subside in mid 1844. Returns in the banking and insurance sectors grew slowly and steadily over the period. The figure shows positive trends in cumulative returns for banks, insurance, metals, and shipping and trade, yet cumulative returns to the railway sector far outdistanced all others. Our findings on the dominance of the railway sector concur with previous studies (Campbell and Turner 2010, 2012, 2018; Odlyzko 2010; Campbell, Turner and Walker 2012; Quinn and Turner 2020).

Figure 2 displays the periods of legislative activity related to Parliament's consideration of reform initiatives. Six liberal policy innovations in 1844–5 marked Prime Minister Robert Peel's economic reforms.[2] These reforms entailed liberal policy changes that would improve cash flows to shareholders, reduce agency costs and uncertainty, and/or promote consolidation.[3] The six legislative initiatives form the focus of this study.

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[2] Parliament did pass other legislation during the run-up, but most Acts fell outside of the realm of economic policy. These other Acts support no rationale for an impact on returns to shareholders.

[3] The arrival of news that reduced uncertainty would prompt investors to revise expectations upward and bid up the share price to a level consistent with the improved certainty. The price change would produce a positive return at that date.
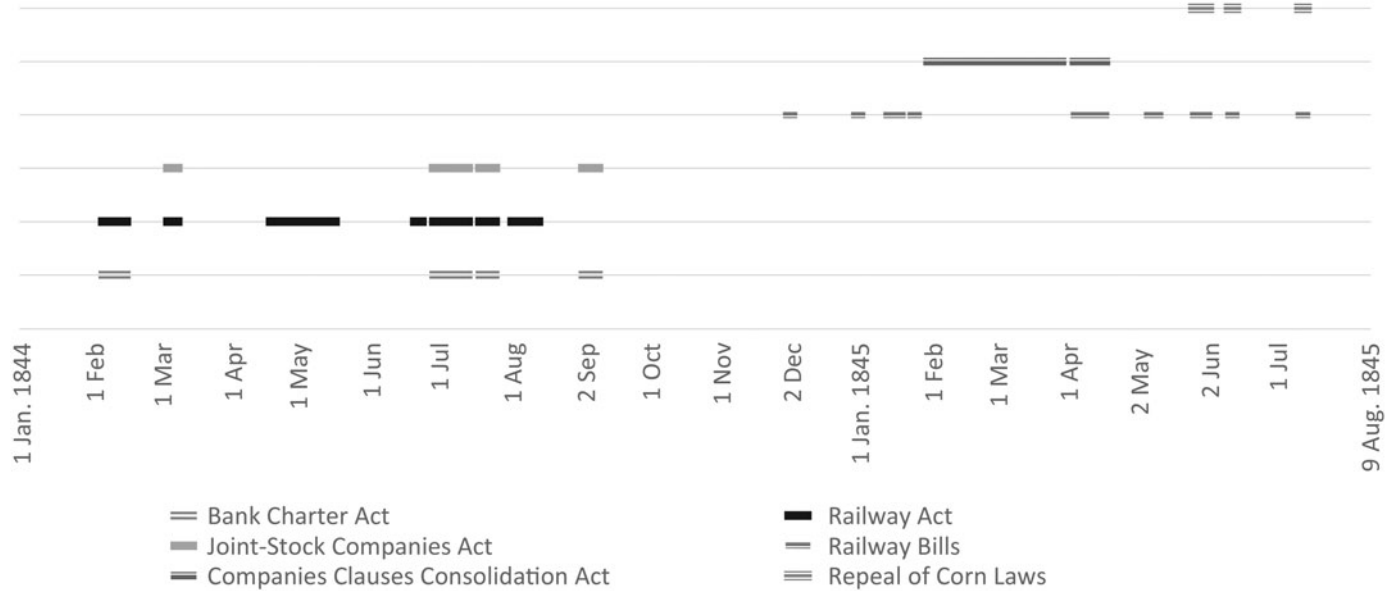
Figure 2. *Overlapping liberalization reform initiatives*
This chart displays the 18 events during which Parliament debated each of the six economic reform initiatives and when any material news subsequently arrived. The 18 episodes conform to the dates displayed in Table 2. The horizontal bars display the length of each episode.
Source: Authors' figure based on reporting in *The Times, The Economist* and Hansard (*Parliamentary Debates*).

Joint-Stock Companies Act of 1844 (7 & 8 Vict c 110). This Act required companies to report to investors via semiannual balance sheets confirmed by three directors and auditors, thereby promoting transparency, accountability, and the reduction of agency costs. Also, the Act streamlined the process by which entrepreneurs could organize a joint-stock company, thereby lowering the costs of entry into corporate status. Turner (2017, p. 17) called the Act 'revolutionary'. Harris (2000, p. 284) noted 'for the first time in at least 500 years, corporations could be formed without explicit, deliberate, and specific State permission'. The Act applied less broadly to banks, insurance companies, railways and public utilities, which still required parliamentary approval. However, several provisions regarding the registration of securities (and, by implication, shareholder voting and the maintenance of corporate records) *did* apply to railways, banks and others as contemporary analysts such as Tuck (1845, p. xii) emphasized. Improved transparency and shareholder governance aimed to address frauds and other abuses of recent years. Passage of the Act signaled a dramatic change in government policy, setting a precedent that would eventually apply to the excepted industries. Prior research has established that enhanced monitoring and transparency are associated with higher shareholder returns (Jensen and Meckling 1976; Gompers, Ishii and Metrick 2003; Bebchuk, Cohen and Ferrell 2009; Schmidt and Fahlenbrach 2017). In sum, we hypothesize that the passage of this Act would raise expectations of returns for shareholders.

Ironically, the Act may have stoked the expansion of Britain's railway industry. Kostal (1994, 35) wrote that registration of railway securities granted railways 'the gloss of legality and legitimacy … to gain the appearance of genuine railway capitalists'. Such appearances helped new railways to raise start-up capital. And the flowering of young short-line railways fed the acquisitive appetites of consolidators.

Railway Regulation Act of 1844 (7 & 8 Vict. C. 85). The history of this law began as a costly burden to established railways and ended as a strategic benefit. Public ire over rising ticket prices and shipping rates prompted parliamentary concern about monopolistic behavior by railways (Bailey 2004, p. 12). Reformers had proposed price controls and even nationalization, in parliamentary debates since at least 1836. On 5 February 1844, president of the Board of Trade, William Gladstone, moved that Parliament should charter a Select Committee on Railways to recommend reforms. Gladstone's motion stimulated debate on 6 and 10 February. It commenced a new policy vision for the industrial organization of Britain's railway sector.

The Select Committee's recommendations formed the basis of the Railway Regulation Act. The initial draft of the Act proposed a ceiling on the allowed rate of return to railway shareholders. It empowered the government to acquire railway companies that earned excessive returns. Thus, the original form of the Act opened the door to railway nationalization. Representatives of the railways reacted angrily to the draft legislation, especially its provisions for rate regulation and possible nationalization. In the face of withering opposition from railway interests and concerns about a threat to private property rights implicit in nationalization (Bailey 2004, p. 22), Gladstone revised the bill to stipulate that no price controls or

nationalization would take place for at least 21 years on any *new* line. The revision defined a new line as any newly organized railway *or* any existing railway that acquired other lines. This incentivized any incumbent railway to acquire another, which as we argue below, motivated consolidation in the industry. Since virtually all railway companies regularly acquired other lines, the new draft offered to the industry an extendable 21-year standstill on rate ceilings and nationalization.

   Gladstone's new draft marked 'a dramatic climb-down on the part of the government' (Bailey 1995, p. 45). Passage in the House of Commons of the weakened Railway Regulation Act on 19 July 1844 reduced the exposure of railway stockholders to risks of rate regulation and nationalization. Without overtly calling for consolidation of the railway industry into a few major systems, Gladstone's bill afforded a push in that direction. Operating regulations in the Act mandated additional service at low prices to the government and the public, thus creating competitive barriers[4] and shifted competitive advantage to incumbent railways that were sufficiently large and profitable to shoulder the added costs[5] of the mandate. Accordingly, the mandated services spurred system consolidation. Even so, petitions for new railway charters increased sharply in 1844–5. The rush to establish new railways reflected haste to exploit first-mover advantages in claiming uncontested locales. Some new railways sought to gain the charter and rights-of-way and then sell quickly to a consolidator.[6] The rapid build-out of the railway industry reflected the jockeying for strategic positions that tended to favor early movers and large companies with the resources to acquire others. The proposal and passage of the weakened bill marked a change favorable to shareholders' expectations and would be reflected in positive returns. We hypothesize that events related to the revision and passage of Gladstone's Railway Act ultimately raised expectations of shareholder returns to our sample of incumbents.

   Board of Trade Select Committee Recommendations on Petitions for Railway Charters. Petitions for charters surged from 66 reviewed in 1844 to nearly 280 under review by January 1845. To deal with the growing volume, William Gladstone appointed another Select Committee of Members of Parliament to screen the petitions and recommend action. The committee's recommendations did not change the authority of Parliament to approve individual petitions, though they proved to be highly influential in Parliament's deliberations. Shareholder interest in the petitions for charters (or charter changes) focused on how the charters would change competition in any local or regional market. The economics of the railway industry created a rationale

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[4] That government regulations may create barriers to entry or operation has been a staple of industrial organization economics (Stigler 1971; Dean and Brown 1995; Cochrane 2014).

[5] For instance, the Act required that every railway should operate at least one train per day on every route accessible at third-class (i.e. low) fare regardless of market demand and with stops at all stations. The cost of providing such service was a particular burden to marginal operators, many of whom were small.

[6] Exemplars of consolidators were Isambard Kingdom Brunel's Great Western Railway and George Hudson's Midland system during this period.

for the consolidation of Britain's many small railways into a few large systems.[7] Samuel Laing, secretary to the Railway Department of the Board of Trade, declared in January 1844 that 'the principal railway communications of the kingdom will be parceled out into six or eight great systems' (Simmons 1978, p. 36).

Compounding the vision of the Board of Trade and the incentives for consolidation inherent in railway industry economics, news that the Select Committee reports on railway petitions in January 1845 indicated a preference for approving charters to the advantage of incumbent railways over new entrants would have resolved regulatory uncertainty for the railway companies and presaged enhanced competitive position and benefits for the incumbent railways. We hypothesize that this news raised investor expectations for future returns.

Such news would also encourage railway managers to grow their firms through organic expansion and acquisition. Gorton, Kahl and Rosen (2009) argue that larger firm size 'becomes the driving force for merger dynamics in industries with economies of scale' (Gorton et al. 2009, p. 1294). Size confers an edge for surviving independently, thus serving managers' self-interest. Such motivations can prompt merger waves and consolidation within industries. Whether growth and consolidation create value for shareholders depends on opportunities for efficiency improvements. Railway economics and anecdotal evidence suggest that such opportunities existed in 1844.

Bank Charter Act of 1844 (7 & 8 Vict. C. 32). The Act increased the Bank of England's (BoE's) monopoly on note issuance, established a minimum reserve formula to regulate note issuance, and required weekly reporting of its financial condition to the public. The Act also separated the BoE's commercial lending and banknote issuance into separate departments, each with separate regulations. The change motivated the BoE to function as a regular commercial lender. During debate on the Act, the BoE disclosed that it would expand its commercial lending activity and lower its base rate by 150 basis points after the Act became effective. This policy shift was contingent upon enactment – the benefits of the Act would likely be reflected in share prices upon news of enactment more than news of implementation of the new policy. The Act and its subsequent shift in monetary policy would benefit railway shareholders from the increased transparency of BoE monetary policy, reduced uncertainty about credit conditions, growth in the supply of credit,[8] and the mobilization of capital for railway sector expansion. Tuck

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[7] Contemporary accounts and subsequent analyses by railway researchers highlighted factors of railway performance such as scale economies, system efficiencies, natural monopolies, reduction of agency costs and first-mover advantages as contributing to the impulse toward consolidation (Tuck 1845; Lewin 1925, [1936] 1968; Ellis 1954; Simmons 1978; Ransom 1990).

[8] Prior research finds that greater access to credit, equity capital, and financial services is positively associated with economic growth (Demirgüç-Kunt and Feyen 1996; Ayyagari, Demirgüç-Kunt and Maksimovic 2008, 2011; Beck and Demirgüç-Kunt 2008; Beck, Demirgüç-Kunt and Honohan 2009; Demirgüç-Kunt, Feyen and Levine 2013) and that expansion of the money supply is associated with positive returns to equity investors (Ehrmann and Fratzscher 2004; Bernanke and Kuttner 2005; Chen 2007; Chun 2011; Gali and Gambetti 2015; Campbell et al. 2018).

(1845, p. xiii) noted that 'railways can borrow one-third of their capital at interest on mortgage bonds', implying that railways would be sensitive to variations in monetary policy. The railway sector had become the major recipient of capital investment during this period, and any increase in credit availability or reduction in capital costs would have positively impacted railway stock prices. Therefore, we hypothesize that news related to the rising probability of enactment of the Bank Charter Act was associated with positive returns to shareholders.

Companies Clauses Consolidation Act of 1845 (8 & 9 Vict c 20). In response to fraud, embezzlement and bankruptcies, Prime Minister Peel sought to heighten standards for the governance of companies. This law amended the Joint-Stock Companies Act of 1844 to establish standards regarding shareholder voting, election of directors, the appointment of auditors, the accountability of officers, and the payment of dividends. The Act's passage marked a major step toward modern financial transparency and governance standards, which would likely benefit shareholders by reducing agency costs. We hypothesize that news about Parliament's development of the Companies Clauses Consolidation Act was associated with positive shareholder returns.

Corn Laws. Since the 1830s, 'free trader' Members of Parliament called for repeal of the Corn Laws, which imposed heavy tariffs on the importation of wheat and other grains (all called 'corn'). The Corn Laws benefited landholders in Britain and raised the cost of food for the public. Although Parliament had rejected the repeal only two years before, Lord John Russell, the leader of the liberal Whig Party, signaled that the return of free trade was a priority for debate. On Saturday, 31 May 1845, *The Times* reported that Russell introduced nine resolutions in the House of Commons aimed at providing relief for the poor – one of the resolutions called for a reduction of Corn Law tariffs to reduce the cost of food. Prime Minister Robert Peel had advocated free trade but could not surmount the protectionist majority in his own Tory Party. However, Russell's speech opened the possibility of a coalition of Peelite free traders and Russell's Liberal Party that would repeal the Corn Laws. Though opponents defeated Russell's resolutions shortly after, his speech signaled a landmark shift toward a new paradigm of free trade that ultimately led to repeal in 1846.

Railway promoters and investors believed that demand for rail services would increase with increased importation of goods. *Railway World* later asserted that protection raised the price of food and constrained the ability of the population to pay for transportation and, therefore, depressed profits and share prices (Kostal 1994, pp. 166–7). Industry publications predicted repeal would 'precipitate the surge of capital investment in railway shares' (Kostal 1994, p. 168). We hypothesize that Russell's resolution to repeal the Corn Laws represented a major policy change that raised expectations for shareholder returns. The extent of such expectations is indicated by the rise in wheat and wheat flour imports given in Barnes ([1930] 1961, p. 290). From 1843 to 1845, imports averaged about one million quarters per year; from 1846 (when Parliament repealed the Corn Laws) to 1854, annual imports averaged five million quarters per year. As of 1844, it would have been hard to foresee the increased shipments precisely. However, optimistic expectations of railway shareholder returns from free

trade were not inconsistent with the outcome. The five-fold increase in these imported commodities represented a bonanza to the British transportation sector.

The surprise in all these policy initiatives was as much about timing as about substance. The Conservative Party returned to power in 1841 with a large majority, elevating Peel to prime minister and empowering his vision for liberalization. Peel was a new-style conservative who sought reform rather than retrenchment. His priorities – particularly toward free trade – fractured the Tory coalition of landholding gentry and the new industrialists and entrepreneurs. As of early 1844, Peel saw the prospect of his ouster and relished 'a dose of martyrdom' (Hilton 2008, p. 508). Believing that he was running out of time, Peel accelerated his liberalization program in 1844. Peel's rapid action meant that the timing of these enactments was as much of a surprise to investors as were their details.

IV

A study of investor response to legislative news would seem to be an ideal application of the conventional event study methodology in financial economics. However, three aspects of the legislative process and the run-up challenge that methodology's suitability. First, the enactment of a bill entailed three readings in the House of Commons, after which the House of Lords would debate and approve it, followed finally by a grant of Royal Assent. It is unclear where in this process the news of enactment would emerge to affect shareholder expectations. Second, the contemporaneity and adjacency of days[9] when the various reforms were debated in Parliament (as displayed in Figure 2) challenges the ability to pinpoint the association of returns with news of individual bills. Third, the context of a run-up challenges a foundational assumption of parametric tests of significance in conventional event study methodology that returns are independent and identically distributed. We document this violation in the results to follow. The skewness, kurtosis, heteroskedasticity and autocorrelation of returns during the run-up require robust tests of significance to these attributes.

The following methodology addresses these challenges. First, we focus on *episodes* consisting of event days that were adjacent or the same for the six legislations, rather than on individual event days. Second, we adopt the bootstrap methodology, a standard finance research tool (Efron and Tibshirani 1986, 1994; Davison and Hinkley 1997; Rogoff and Stavrakeva 2008; Imbens and Menzel 2018). This approach compares the returns distribution of all liberalization news events to the distribution of returns on all run-up days. Third, we employ nonparametric significance tests when testing returns during event episodes versus non-event episodes.

We test two potential implications of liberalization, that (a) the returns over the event episodes significantly exceed the returns measured across the entire run-up, and (b) the

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[9] Contemporaneity refers to the fact that Parliament often debated or voted on more than one item of legislation on any given day. Adjacency describes parliamentary debate on days next to each other that would cause estimates of four-day returns (from day T-1 to day T+2) to overlap.

returns over event episodes significantly exceed the returns during non-event episodes. Regarding (a), our alternative hypothesis (Equation 1) is that the cumulative return across all event episodes (CER) significantly exceeds returns across the *entire* run-up period (RUR). The null hypothesis (Equation 2) posits no significant difference.

(1) H_1: $CER_{\text{Event Days}} > RUR_{\text{All Run-Up Days}}$
(2) H_0: $CER_{\text{Event Days}} = RUR_{\text{All Run-Up Days}}$

We tested (1) with the bootstrap methodology described below. This comparison of event returns to the distribution of returns across all days in the run-up is a more conservative test than the traditional event study method that uses a benchmark of lower pre-run-up returns. In the bootstrap tests, the benchmark against which we compare the event returns consists of event and non-event returns – both elevated during the run-up period – and thus raises the hurdle for the significance of event returns. The bootstrap methodology also reduces the possible impact of errors in selecting days for inclusion in the event periods, as the comparison period is the full run-up, and not limited to non-event returns.

Regarding the second implication, (b), Equation 3 holds that the event period cumulative returns (CER) are significantly greater than the cumulative non-event period returns (CNER). The null hypothesis (Equation 4) posits no significant difference.

(3) H_1: $CER_{\text{Event Days}} > CNER_{\text{Non-event Days}}$.
(4) H_0: $CER_{\text{Event Days}} = CNER_{\text{Non-event Days}}$.

We tested (3) with parametric and nonparametric statistics. The parametric comparison of event days with non-event days is typical of standard event study methodology in financial economics, though as we argued earlier, the special conditions of a run-up challenge the application of this approach. Therefore, we also report nonparametric test statistics.

We estimate a daily return on each security and value-weighted returns on six portfolios: the entire sample (the market composite) and subsamples representing five industrial sectors. The returns on individual securities in each portfolio are estimated by:

(5) $R_{ht} = (P_{h,t}/P_{h,t-1}) - 1$

Where:

$P_{h,t}$ = price of security h at day t
$P_{h,t-1}$ = price of security h at day t-1

Our returns do not include dividends since the exact dates of dividend declaration and payment were absent in available sources.[10] Campbell ([2009](#)) computed monthly returns with dividends after ascertaining months in which dividend announcements

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[10] We consulted *The Times*, *The Railway Times*, *The Economist*, Henry Tuck's *The Railway Shareholder's Manual*, *Course of the Exchange* and generally the British Newspaper Archive. None of these sources enabled us to document dates of dividend announcements or payments for firms in our sample.

occurred. He reports that dividends were an important portion of the total returns to shareholders during the 1840s. To our knowledge, no other study of this period using daily returns has included dividend payments. The advantage of focusing on daily returns, even without dividends, is that they afford a more precise test of the impact of daily news about liberalizing legislation than would be available using monthly returns.

We calculate the value-weighted average daily return on portfolio i at day t based on the returns for security h at day t and the reported capitalization of each firm, W_h, computed as a percentage of the total capitalization of the market portfolio, recomputed daily:

$$(6) \quad R_{i,t} = \sum_{h=0}^{n} R_{h,t} \, W_{h,t}$$

Finally, to estimate the cumulative event return for portfolio i over days K to L, we compute the return as

$$(7) \quad CER_{i,K,L} = \sum_{t=K}^{L} R_{i,t=K,L}$$

To account for the slow diffusion of news in Britain during the 1840s, we estimate CERs for the market composite sample and industry subsample portfolios from day K, the day before (day T-1) the first publication of news (day T=0) in the legislative episode, to day L, two days after the last publication date in the episode (day T+2). Day 0 consisted of the observed (or imputed[11]) publication date in *The Times*. We estimated that disseminating economic and political news through Great Britain took at least one day to reach Manchester and Liverpool from London, and another day to return trading instructions back to London. For single-day events, returns are cumulated from the day before the event to two days after. For episodes of two or more adjacent events, returns are cumulated from the day before the first event in the episode to two days after the last event.

We tested the significance of returns in the episodes of liberalizing legislation in two ways:

a. A nonparametric test (Mann–Whitney U) of the difference in distributions of returns during the event days compared to the non-event days. To compare the nonparametric results with standard event study methodology, we also report the parametric Student's t-statistic. Table 1 (lines 36 and 37) reports these test statistics for Hypothesis 3.

b. A bootstrap test of the significance of the episode returns (CER) was measured over N days and compared to the distribution of returns over the entire run-up. Table 1 (line 38) presents test results of Hypothesis 1 over the entire 498 days of the run-up; Table 2 gives bootstrap test results of Hypothesis 1 for the 18 event episodes, which

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[11] Where *The Times* did not report news of the event, we ascertained the actual date of occurrence from sources such as Hansard and then imputed the press date as the date after the actual event.

Table 1. *Test for significance of event episode returns*

This table presents sample statistics for the entire period (panel A), the non-event periods (panel b) and the event periods (panel C). On each distribution we perform a Jarque–Bera test for normality and report its p-value. In panels D and E we present the results of tests for the difference in means between non-event and event periods using the parametric student's t statistic (panel D) and the nonparametric Mann–Whitney U (panel E). Finally, panel F reports results of the bootstrap test for the significance of event episode returns against the distribution of returns across the entire run-up.

Row		Composite portfolio	Railway sector	Bank sector	Insurance sector	Metals sector	Shipping & trade sector
1	Number of securities	100	31	21	32	10	6
	Panel A: Returns over entire period of study, 1 Jan. 1844 to 9 Aug. 1845						
2	Number of daily observations	498	498	498	498	498	498
3	Cumulative return for entire period	29.7%	63.5%	14.6%	12.2%	21.6%	2.8%
4	% of zero-return days to total	0%	3%	12%	72%	55%	44%
5	Mean	0.060%	0.127%	0.029%	0.025%	0.043%	0.006%
6	Median	0.051%	0.099%	0.005%	0.000%	0.000%	0.000%
7	Standard deviation	0.168%	0.415%	0.189%	0.125%	0.545%	0.384%
8	Skewness	0.59	2.18	0.31	4.69	1.60	−1.95
9	Kurtosis	1.42	15.54	3.01	33.53	22.10	41.63
10	Jarque–Bera p-value, test for normality	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
	Panel B: Returns for non-event episodes, 1 Jan. 1844 to 9 Aug. 1845						
11	Number of daily observations	311	311	311	311	311	311
12	Cumulative return for all non-event episodes	16.0%	26.2%	13.7%	7.9%	13.8%	5.6%
13	Cumulative return of non-event episodes as % of all days	53.8%	41.3%	93.4%	64.3%	64.0%	204.0%
14	Number of non-event days as % of all days	62.4%	62.4%	62.4%	62.4%	62.4%	62.4%

15	% of zero-return days to non–event days total	0%	4%	11%	72%	53%	45%
16	Mean	0.051%	0.084%	0.044%	0.025%	0.045%	0.018%
17	Median	0.048%	0.056%	0.013%	0.000%	0.000%	0.000%
18	Standard deviation	0.162%	0.407%	0.196%	0.121%	0.595%	0.427%
19	Skewness	0.49	2.99	0.26	5.22	1.99	–2.30
20	Kurtosis	1.11	26.31	3.62	39.60	23.35	43.25
21	Jarque–Bera p-value, test for normality	0.008%	0.000%	0.000%	0.000%	0.000%	0.000%

Panel C: Returns for event episodes, 1 Jan. 1844 to 9 Aug. 1845

22	Number of daily observations	187	187	187	187	187	187
23	Cumulative return for all event episodes	13.7%	37.2%	1.0%	4.4%	7.8%	–2.9%
24	Cumulative return of event days as % of all days (L. 23/L.3)	46.2%	58.7%	6.6%	35.7%	36.0%	–104.0%
25	Number of event days as % of all days	37.6%	37.6%	37.6%	37.6%	37.6%	37.6%
26	% of zero-return days to event days total	0%	1%	14%	74%	58%	43%
27	Mean	0.073%	0.199%	0.005%	0.023%	0.042%	–0.015%
28	Median	0.062%	0.138%	0.000%	0.000%	0.000%	0.000%
29	Standard deviation	0.179%	0.419%	0.175%	0.133%	0.452%	0.300%
30	Skewness	0.67	1.06	0.33	4.02	–0.08	–0.16
31	Kurtosis	1.67	2.37	1.44	26.64	7.98	5.76
32	Jarque–Bera P-value, test for normality	0.000%	0.000%	0.021%	0.000%	0.000%	0.000%

Panel D: Parametric test for difference of means: event vs. non–event episodes[a]

33	Mean returns difference (event > non-event)	0.02%	0.11%	–0.04%	0.00%	0.00%	–0.03%
34	Student's t statistic	1.406	3.013	–2.222	–0.170	–0.057	–0.942
35	P=value of t-score (1-tail: event > non-event)	0.080	0.001	0.987	0.567	0.523	0.827

Panel E: Nonparametric test for difference of distributions: event vs. non–event episodes

36	Mann–Whitney U Z-score	1.290	2.852	–2.682	–0.665	0.970	–0.985

Continued

Table 1. *Continued*

Row		Composite portfolio	Railway sector	Bank sector	Insurance sector	Metals sector	Shipping & trade sector
37	P-value of Z-score (1-tail: event > non-event)	0.098	0.002	0.996	0.747	0.166	0.838
	Panel F: Bootstrap test for difference of all event episode returns versus cumulative returns for the run-up						
38	Bootstrap p (1-tail, event > run-up)	0.141	0.009	0.958	0.550	0.535	0.873

[a]The Levene tests of the equality of variances between event and non–event episodes revealed insignificant differences for the returns series. Therefore, our t-test for the market and sector returns assumes equal variances.

Table 2. *Significance of returns at 18 event periods for all sectors*
This table presents the cumulative event episode returns (CER) for 18 episodes for the market composite portfolio and for five industry sectors. The test p-values are based on bootstrap analysis comparing the CERs against the distribution of returns over the entire run-up.

Row	Event period and legislation	Market composite	Railway sector	Bank sector	Insurance sector	Metals sector	Shipping & trade sector
	Number of securities	100	31	21	32	10	6
1	5–15 Feb. 1844: BCA, RA	–0.17%	–1.38%	0.33%	0.82%	0.75%	–0.17%
2	4–8 Mar. 1844: JSCA, RA	1.42%**	3.08%**	0.81%*	0.11%	1.24%	1.07%*
3	18 Apr. – 17 May 1844: RA	0.08%	2.90%	–1.92%	1.10%	0.93%	–1.15%
4	20–24 June 1844: RA	0.20%	0.32%	0.20%	0.00%	1.17%	0.01%
5	28 June – 13 July 1844: BCA, JSCA, RA	0.27%	0.76%	0.45%	–0.09%	–0.18%	–0.75%
6	18–25 July 1844: BCA, JSCA, RA	1.13%	3.08%*	0.23%	0.40%	1.63%	0.12%
7	1–13 Aug. 1844: RA	–0.28%	–0.15%	–0.20%	0.19%	–3.35%	–0.81%
8	31 Aug.– 7 Sep. 1844: BCA, JSCA	1.31%*	2.93%*	0.45%	0.24%	0.80%	1.10%*
9	29 Nov. – 3 Dec. 1844: RB	0.71%	1.06%	0.49%	0.03%	0.83%	0.99%*
10	30 Dec. 1844 – 2 Jan. 1845: RB	0.58%	1.26%	0.31%	0.11%	0.36%	0.15%
11	13–20 Jan. 1845: RB	1.75%**	4.94%**	0.16%	0.03%	0.20%	–0.19%
12	23–27 Jan. 1845: RB	0.08%	–0.02%	0.17%	0.00%	0.00%	0.16%
13	Jan. 30 – 29 Mar. 1845: CCC	2.94%	9.01%	–0.99%	0.42%	3.60%	–1.01%
14	3–17 Apr. 1845: CCC, RB	–0.19%	0.39%	–0.40%	–0.08%	–1.82%	–1.22%
15	6–12 May 1845: RB	–0.10%	–0.41%	0.12%	0.09%	1.11%	–0.10%
16	26 May – 2 June 1845: CL, RB	2.99%***	7.69%***	–0.01%	0.03%	1.51%	–0.68%
17	10–13 June 1845: CL, RB	0.62%	0.94%	0.71%*	0.00%	–0.09%	0.00%
18	10–14 July 1845: RB	0.38%	0.82%	0.04%	0.94%**	–0.91%	–0.39%

Notes:
1. Significance level of a two-tailed test is indicated as follows: *p<0.1; **p<0.05; ***p<0.01.
2. The legislation is coded as follows: BCA (Bank Charter Act), RA (Railway Act), JSCA (Joint-Stock Companies Act), RB (recommendations by Board of Trade Select Committee of Railways regarding pending petitions for charters), CCC (Companies Clauses Consolidation Act), CL (proposals for repeal of the Corn Laws).

vary in the number of days. The bootstrap test draws periods of the same length as the event windows from the full distribution of returns during the run-up.[12] We calculate p-values from the position of the real cumulative event returns in the top tail of their bootstrapped distribution of cumulative event returns, constructed from the simulations. Therefore, p<0.05 in a one-tailed test would indicate a five percent probability that the event's cumulative returns were due to chance.

The chronology of events in the development of the six liberalizing laws draws from our hand-collected data set from examination of Hansard (*Parliamentary Debates*), the Bank of England historical database, *The London Gazette*, *The Times*, *Course of the Exchange*, *The Economist* and archival records from two contemporary banks (Barings and Rothschilds). From the Global Financial Data set, we identified 100 firms whose shares on the London Stock Exchange were listed continuously from 1 January 1844 to 9 August 1845. Continuous listing afforded a stable sample of securities and a basis for comparing returns among liberalizing events. We ignored securities such as 'scrip' and equities with deficient capitalization data.[13] We computed a daily return on each security. Then, we calculated value-weighted averages for the composite portfolio and five subsamples representing different industrial sectors.[14]

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[12] In the bootstrap test for 18 individual event episodes (Table 2), we calculate the percentile of CER in a distribution of cumulative returns (RUR) created from 100,000 simulations. The statistical test is whether CER is an outlier in the distribution of randomly selected cumulative returns across periods of length same as CER. In other words, does α exceed a threshold level of significance (such as 1 percent, 5 percent, or 10 percent)? For the bootstrap test of all event periods together (Table 1), in each simulation we randomly place the 18 event episode windows and 19 non-event period windows inside the full run-up period. In order to avoid serial correlation issues among the returns, we keep the length of the 18 event episode windows as well as the length of the 19 non-event period windows the same and only vary their ordering in the run-up time series. We also make sure not to place event episodes next to one another as that would result in a higher-length 'joint' event episode than the original events (we show in Appendix 5 (online) that the results are robust in comparison to a possible alternative treatment). For the same reasons, we avoid placing non-event periods consecutively. Therefore, in each of the 100,000 simulations we have the following sequence of 37 periods arranged in the run-up time series: *non-event period$_1$, event episode$_1$, non-event period$_2$, . . ., non-event period$_{18}$, event episode$_{18}$, non-event period$_{19}$* where the bootstrapped period lengths have been randomly drawn from the original observation and non-event series respectively, without replacement. Then we employ the bootstrap methodology to test whether the returns to investors associated with liberalizing legislation are significantly different from the full run-up period returns at 18 specific liberalization episodes. The null hypothesis posits no significant difference at these 18 episodes.

[13] Scrip was an installment purchase claim on underlying shares, and therefore was a derivative, not primary, equity claim. For the sake of strict comparability among returns on the shares of different companies, we excluded scrip from this study.

[14] For brevity, we refer the interested reader to results posted online about five robustness tests, which affirm our methodology. Appendix 1 validates the Global Financial Data dataset against a data set used in other published research, and upon the work of other researchers. Appendix 2 tests for effects of possible information leakage and finds no material difference in results if the observation period is increased. Appendix 3 assesses the possible impact of non-trading or flat-trading days and finds no

Table 1 describes the distributions of CER and CNER for the market composite portfolio and for five constituent industry sector subsamples. The distributions skew positive (lines 8, 19 and 30), consistent with the run–up trends over this period. And the returns display positive excess kurtosis (lines 9, 20 and 31), which is not surprising given the equity market run–up. The Jarque–Bera test coefficients (lines 10, 21 and 32) yield very low probabilities that the returns for the six portfolios fit a normal distribution – this was one motivation for our decision to apply the boot-strap methodology and nonparametric significance tests (lines 36, 37 and 38).

<center>V</center>

Table 1 reveals that the event returns summed across all event episodes cumulate to 58.7 percent for the railway subsample and 46.2 percent for the market composite sample (line 24). For railways and the composite, the mean and median returns for the event periods (lines 27 and 28) materially exceed the mean and median returns for the non–event periods (lines 16 and 17); the mean and median returns for the other sectors differ immaterially between the event periods and non–event periods.

Tests of hypothesis 1 ($CER_{i,t} > RUR_{i,t}$) confirm a significant positive difference for the railway sector. The bootstrap test (line 38) finds a significant positive difference for the railway sector (p=0.009) and accepts Hypothesis 1. The bootstrap p–values for the other sectors reject Hypothesis 1.

Tests of hypothesis 3 ($CER_{i,t} > CNER_{i,t}$) also confirm significant differences for the railway sector. Using the nonparametric Mann–Whitney U test, lines 37 reports p=0.002 for the railway sector and p=0.098 for the market composite portfolio and support Hypothesis 1. Test statistics for the other sectors reject Hypothesis 1. The parametric test statistics also confirm these results (lines 34 and 35). These results affirm that the liberalizing legislation was strongly associated with the run–up in the railway sector.

Table 2 presents estimates of the cumulative returns and bootstrap significance tests for the market composite portfolio and the five industrial sector indexes at the 18 event episodes related to news about liberalizing legislation. Two dominant insights emerge.

First, consistent with the results in Table 1, the railway sector displays significant positive returns at legislative episodes, more than do other sectors. Of the 18-episode railway returns, 14 are positive (78 percent), and five are significant. The CER associated with Peel's introduction of the Joint–Stock Companies Act is

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material difference if observations on such days are excluded from the sample. Appendix 4 reports the results of cross–sectional regression of daily returns against factors of monetary policy and grain prices, none of which is significant. Appendix 5 tests the robustness of the bootstrap analysis by relaxing the method of placing event and non–event episodes in the full run–up period during the bootstrap simu-lations, by not imposing a flip between each event and non–event period. The tests reveal no material differences. These results are presented in the supplementary materials document available online.

3.08 percent (line 2). An examination of the exact event days shows that most of the gain occurred in the news about the Joint-Stock Companies Act. The next significant CER is associated with final enactment of the Joint-Stock Companies Act, the Railway Act and the Bank Charter Act, 3.08 percent (line 6). The third significant CER, 2.93 percent (line 8) occurs with the Royal Assent and implementation of the Bank Charter Act and the Joint-Stock Companies Act. The fourth significant return accompanies the Board of Trade's first reports of the Select Committee that signaled a preference for incumbent railways, 4.94 percent (line 11). Russell's intro-duction of resolutions to repeal the Corn Laws is associated with the largest and most significant return to the railway subsample, 7.69 percent (line 16). Together, these five significant episodes sum to 21.72 percent, or 34.2 percent of the total run-up in the railway subsample (63.5 percent, Table 1, line 3). The other four sectors display fewer significant event returns but directionally agree with the finding of positive returns associated with liberalization episodes.[15]

  Second, examining legislation associated with each event episode lends clues about the strength of association with returns for the six broad liberalization initiatives. A cautious interpretation follows since Figure 2 and Table 2 show substantial overlaps among deliberations on the various acts, thus preventing rigorous testing of the impact of separate acts. That said, three liberalizing initiatives stand out:

- *Laws affecting railway industry structure*. The Railway Act of 1844 is associated with two significant episodes (Table 2, lines 2 and 6) that aggregate 6.16 percent. Parliament's decisions about railway bills are associated with cumulative returns of 16.67. Across all event episodes concerning the Railway Act or deliberations on railway bills, returns sum to 25.28 percent. These returns suggest the gravity of regime shift in favor of incumbent companies as Parliament debated regulations and petitions for chartering new companies or extending lines of existing companies. We hypothe-sized that such news would be associated with favorable returns to incumbent railway companies.

- *Laws about agency, transparency and governance*. The Joint-Stock Companies Act (JSCA) is associated with positive and significant CERs for railways (Table 2, lines 2, 6 and 8). The sum of railway CERs at the four episodes (lines 2, 5, 6 and 8) in which the Joint-Stock Companies Act was debated is 9.85 percent, or 15.5 percent of the total run-up for railways (63.5 percent, Table 1, line 3). The Companies Clauses Consolidation Act (CCCA) of 1845 supplemented the JSCA and is reflected in two episodes (lines 13 and 14) that total 9.4 percent and include the largest episode return in Table 2, 9.01 percent (line 13) – the absence of statistical significance of this episode is likely associated with its nearly two-month

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[15] Banking shows two positive and significant event returns (lines 2 and 17). Insurance shows one posi-tive and significant return (line 18), and Shipping & Trade shows three positive and significant returns (lines 2, 8 and 9).

length. Across all episodes about the JSCA and CCCA, returns total 19.25 percent, for which the sign, significance, and size are consistent with our hypotheses.[16]

- *Resolution for free trade.* Russell's resolution to repeal the Corn Laws (lines 16 and 17) is associated with a significant and positive CER in railways of 8.63 percent, of which 7.69 percent (line 16) occurs with Lord Russell's speech on 31 May 1845. The results are consistent with our hypothesis that news of this policy shift would be associated with positive returns to railway shareholders.

VI

To illuminate the possible influences on returns on railway stocks during the run-up, we conducted cross-sectional analyses of the possible impact of regional location, capitalization size, credit conditions, and grain prices. The results highlight the concentration of large CERs among the largest tercile and railways in England's Midlands and South regions.

Tables 3 and 4 present tests of both hypotheses 1 and 3 for the railway sector by region of operation. 'South' indicates companies operating south of the latitude of Cambridge, except for the Eastern Counties Railway whose market orientation leaned toward London rather than Midlands industrial centers. 'Midlands' entails railways that operated substantially in Warwickshire, Northamptonshire, Leicestershire, Nottinghamshire, Derbyshire, Staffordshire, Worcestershire and Lincolnshire – the Midlands of England. And 'North' indicates firms focused north of the Midlands and into Scotland. Two firms operating in Ireland and three based in France are in separate segments.

Table 3 reveals that the CERs for British railways on event days (line 16) are large compared to non-event episodes (line 9). Railways in the Midlands region received cumulative event returns of 44.8 percent for event episodes (line 16) versus 29.7 percent for non-event episodes (line 9). The parametric and nonparametric tests yield p-values at 0.001 (lines 24 and 26). Railways in the South region realized cumulative event returns of 36.2 percent (line 16) compared with non-event returns of 19.1 percent (line 9). Significance tests yield p-values of 0.034 (parametric, line 24) and 0.013 (nonparametric, line 26). The bootstrap test of the event returns compared to the distribution of returns for the entire run-up give a p-value of 0.049 for the South region and 0.012 for the Midlands region (line 27). For the other regions, the returns differences are smaller and generally insignificant, which suggests that

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[16] The Bank Charter Act coincides with the Joint-Stock Companies Act in episodes associated with two significant returns (lines 6 and 8). The simultaneity of these events raises the possibility that the Bank Charter Act was another major driver of the railway run-up. However, negative findings in our cross-sectional analysis of railway returns regressed on monetary factors (for reference, see note 15) rejects that interpretation.

Table 3. *Test for regional variation among railway securities*

This table presents sample statistics for the entire period (panel A), the non–event periods (panel B) and the event periods (panel C). On each distribution we perform a Jarque–Bera test for normality and report its p-value. In panels D and E we present the results of tests for the difference in means between non–event and event periods using the parametric student's t statistic (panel D) and the nonparametric Mann–Whitney U (panel E). Finally, panel F reports results of the bootstrap test for the significance of event episode returns against the distribution of returns across the entire run-up.

Row		All railways	North	Midlands	South	Ireland	France
1	Number of securities	31	5	12	9	2	3
	Panel A: Returns over entire period of study, 1 Jan. 1844 to 9 Aug. 1845						
2	Number of daily observations	498	498	498	498	498	498
3	Cumulative return for entire period	63.5%	51.5%	74.5%	55.3%	81.4%	48.2%
4	Percent of zero-return days to total	3%	15%	5%	5%	86%	10%
5	Mean	0.127%	0.103%	0.150%	0.111%	0.163%	0.097%
6	Standard deviation	0.415%	0.552%	0.490%	0.785%	1.075%	0.868%
7	Jarque–Bera P-value, test for normality	0.000%	0.000%	0.000%	0.000%	0.000%	0.655%
	Panel B: Returns for non–event episodes, 1 Jan. 1844 to 9 Aug. 1845						
8	Number of daily observations	311	311	311	311	311	311
9	Cumulative return for all non-event episodes	26.2%	23.9%	29.7%	19.1%	38.9%	24.3%
10	Cumulative return of non-event episodes as % of all days	41.4%	46.4%	39.9%	34.5%	47.8%	50.4%
11	% of zero-return days to non-event days total	4%	15%	5%	6%	85%	12%
12	Mean	0.084%	0.077%	0.096%	0.061%	0.125%	0.078%
13	Standard deviation	0.407%	0.495%	0.462%	0.817%	0.866%	0.889%
14	Jarque–Bera P-value, test for normality	0.000%	0.000%	0.000%	0.000%	0.000%	4.166%
	Panel C: Returns for event episodes, 1 Jan. 1844 to 9 Aug. 1845						
15	Number of daily observations	187	187	187	187	187	187
16	Cumulative return for all event episodes	37.2%	27.6%	44.8%	36.2%	42.5%	23.9%
17	Cumulative return of event days as % of all days (L. 16/L.3)	58.7%	53.6%	60.1%	65.5%	52.2%	49.6%

18	% of zero-return days to event days total	1%	16%	4%	3%	88%	9%
19	Mean	0.199%	0.148%	0.240%	0.194%	0.227%	0.128%
20	Standard deviation	0.419%	0.635%	0.523%	0.722%	1.355%	0.832%
21	Jarque–Bera P-value, test for normality	0.000%	0.000%	0.000%	0.000%	0.000%	13.917%
	Panel D: Parametric test for difference of means: observation vs. hold-out periods[a]						
22	Mean returns difference (event >non-event)	0.11%	0.07%	0.14%	0.13%	0.10%	0.05%
23	Student's t statistic	3.014	1.308	3.106	1.828	1.027	0.620
24	P=value of t-score (1-tail: event > non-event)	0.001	0.096	0.001	0.034	0.152	0.268
	Panel E: Nonparametric test for difference of distributions: observation vs. hold-out periods						
25	Mann–Whitney U Z-score	2.852	1.180	3.026	2.232	0.092	0.566
26	P-value of Z-score (1-tail: event > non-event)	0.002	0.119	0.001	0.013	0.463	0.286
	Panel F: Bootstrap test for difference of all observation period returns versus cumulative returns for the run-up						
27	Bootstrap p (1-tail, event > all run-up)	0.009	0.158	0.012	0.049	0.115	0.194

[a]The Levene tests of the equality of variances between event and non-event episodes revealed insignificant differences for the returns series, except for the Midlands and North regions. Therefore, our t-test for the railway returns assumes equal variances for all series, except the Midlands and North ones.

Table 4. *Test for variation of returns by region of railway firms for 18 event episodes*
This table presents the cumulative event episode returns (CER) for 18 episodes for the market composite portfolio and for firms segmented by region of predominant activity. The test p-values are based on bootstrap analysis comparing the CERs against the distribution of returns over the entire run-up.

Row	Event period and legislation	All railways	North	Midlands	South	Ireland	France
	Number of securities	31	5	12	9	3	3
1	5–15 Feb. 1844: BCA, RA	−1.38%	−1.12%	−2.50%	−1.36%	2.33%	0.25%
2	4–8 Mar. 1844: JSCA, RA	3.08%**	2.22%*	2.17%	3.39%*	10.49%***	4.07%**
3	18 Apr. – 17 May 1844: RA	2.90%	0.23%	2.05%	3.86%	5.19%	4.07%
4	20–24 June 1844: RA	0.32%	0.68%	0.26%	0.10%	1.24%	0.47%
5	28 June – 13 July 1844: BCA, JSCA, RA	0.76%	−3.47%	2.81%	0.11%	2.27%	0.21%
6	18–25 July 1844: BCA, JSCA, RA	3.08%*	1.50%	4.75%**	4.08%*	−0.12%	−0.42%
7	1–13 Aug. 1844: RA	−0.15%	1.32%	0.26%	−0.55%	0.28%	−1.24%
8	31 Aug.– 7 Sep. 1844: BCA, JSCA	2.93%*	2.50%	4.94%**	−0.69%	0.00%	5.27%**
9	29 Nov. – 3 Dec. 1844: RB	1.06%	0.82%	0.54%	2.14%	4.31%**	0.42%
10	30 Dec. 1844 – 2 Jan. 1845: RB	1.26%	−0.07%	1.80%	1.50%	8.11%**	−0.52%
11	13–20 Jan. 1845: RB	4.94%**	1.31%	6.20%**	6.22%**	0.33%	2.31%
12	23–27 Jan. 1845: RB	−0.02%	1.35%	−0.69%	−0.53%	4.05%*	1.19%
13	30 Jan. – 29 Mar. 1845: CCC	9.01%	8.89%	8.31%	7.64%	10.03%	12.09%
14	3–17 Apr. 1845: CCC, RB	0.39%	2.28%	1.97%	0.42%	−0.98%	−4.81%
15	6–12 May, 1845: RB	−0.41%	−0.80%	0.36%	−1.12%	0.00%	−1.20%
16	26 May – 2 June 1845: CL, RB	7.69%***	8.94%***	8.99%***	9.48%**	0.00%	0.79%
17	10–13 June 1845: CL, RB	0.94%	1.13%	0.48%	1.69%	0.00%	0.95%
18	10–14 July 1845: RB	0.82%	−0.07%	2.09%*	−0.17%	−5.04%	0.02%

Notes:
1. Significance level of a two-tailed test is indicated as follows: *p<0.1; **p<0.05; ***p<0.01.
2. The legislation is coded as follows: BCA (Bank Charter Act), RA (Railway Act), JSCA (Joint-Stock Companies Act), RB (recommendations by Board of Trade Select Committee of Railways regarding pending petitions for charters), CCC (Companies Clauses Consolidation Act), CL (proposals for repeal of the Corn Laws).

returns associated with liberalization were concentrated in the South and Midlands of England.

Table 4 shows that of the five positive and significant event returns for all railways (lines 2, 6, 8, 11 and 16) the South and Midlands regions of England stand out for positive and significant returns at three episodes (lines 6, 11 and 16) – the Midlands features five significant episode returns (lines 6, 8, 11, 16 and 18) and the South shows four (lines 2, 6, 11 and 16). The South England region included the area of densest population and greatest association with the export/import-related Corn Laws repeal – the benefits of free trade policies would accrue especially to railways in this region. The Midlands region entailed Britain's rapid growth in manufacturing, particularly in textiles – railways in this region would benefit from the growth in the movement of manufactured goods to other domestic markets and abroad. Indeed, the CERs at Russell's proposal to rescind the Corn Laws (line 16) are large and significant: 8.99 percent for the Midlands region railways, 9.48 percent for railways in the South England region, and 8.94 percent for the North region. The Joint-Stock Companies Act (line 2) is associated with significantly positive CERs for all regional segments other than the Midlands region where the return is positive and large (2.17 percent).

The subsample of three firms based in Ireland also displays four significant event episodes, three associated with railway bills (lines 9, 10 and 12), and one with the notable introduction of the Joint-Stock Companies Act (line 2). The small subsample size, the generally smaller size of these firms, and distance from England leans against attributing the same economic factors to Ireland as to England's South and Midlands regions. This is a subject for possible future research.

We also assessed the cross-sectional variation among returns for railway securities by terciles in terms of their capitalization size. Table 5 presents the distributions and tests of significance. Comparing the return for event episodes (line 16) versus non-event episodes (line 9) reveals that the two larger-size terciles display large and significant differences (see lines 24 and 26). The bootstrap test (line 27) finds a significant difference between the returns for event periods and the distribution of returns across the entire run-up across all terciles – this is consistent with the parametric t-test (line 24). The nonparametric test yields significant differences for the sample of all railways and for the two largest terciles.

Table 6 gives the estimated CERs for the 18 event episodes by size tercile. The general observation is that the largest firms (third tercile) are associated with a larger number of significant CERs (five of them, lines 2, 6, 8, 11 and 16); the second tercile reports four significant CERs, and the smallest tercile has only three. The second and third terciles show positive and significant returns at four episodes (lines 2, 6, 11 and 16). All three terciles are significant at the introduction of the JSCA (line 2). However, in inverse relation with size – this contrasts with the other significant episodes where returns are directly related to size (lines 8, 11 and 16). The resolution of uncertainty about the Select Committee's strategy for approving railway petitions accrues most favorably to the largest tercile. Size mattered. To our knowledge, this is the first documented evidence of a size effect in the railway run-up.

Table 5. *Test for variation in returns by size of capitalization for railway securities*

This table presents sample statistics for the entire period (panel A), the non-event periods (panel B) and the event periods (panel C). On each distribution we perform a Jarque–Bera test for normality and report its p-value. In panels D and E we present the results of tests for the difference in means between non-event and event periods using the parametric student's t statistic (panel D) and the nonparametric Mann–Whitney U (panel E). Finally, panel F reports results of the bootstrap test for the significance of event episode returns against the distribution of returns across the entire run-up.

Row		All railways	First tercile (smallest)	Second tercile	Third tercile (largest)
1	Number of securities	31	11	10	10
	Panel A: Returns over entire period of study, 1 Jan. 1844 to 9 Aug. 1845				
2	Number of daily observations	498	498	498	498
3	Cumulative return for entire period	63.5%	57.9%	59.4%	65.3%
4	% of zero-return days to total	3%	23%	4%	4%
5	Mean	0.127%	0.116%	0.119%	0.131%
6	Standard deviation	0.415%	0.458%	0.454%	0.525%
7	Jarque–Bera p-value, test for normality	0.000%	0.000%	0.000%	0.000%
	Panel B: Returns for non-event episodes, 1 Jan. 1844 to 9 Aug. 1845				
8	Number of daily observations	311	311	311	311
9	Cumulative return for all non-event episodes	26.2%	28.4%	27.4%	25.4%
10	Cumulative return of non-event episodes as % of all days	41.4%	49.0%	46.2%	39.0%
11	Percent of zero-return days to non-event days total	4%	24%	5%	5%
12	Mean	0.084%	0.091%	0.088%	0.082%
13	Standard deviation	0.407%	0.424%	0.421%	0.536%
14	Jarque–Bera P-value, test for normality	0.000%	0.000%	0.000%	0.000%
	Panel C: Returns for event episodes, 1 Jan. 1844 to 9 Aug. 1845				
15	Number of daily observations	187	187	187	187
16	Cumulative return for all event episodes	37.2%	29.6%	32.0%	39.8%
17	Cumulative return of event days as % of all days (L.16/L.3)	58.7%	51.0%	53.8%	61.0%

18	% of zero–return days to event days total	1%	22%	3%	3%
19	Mean	0.199%	0.158%	0.171%	0.213%
20	Standard deviation	0.419%	0.508%	0.501%	0.497%
21	Jarque–Bera P-value, test for normality	0.000%	0.000%	0.000%	0.000%
	Panel D: Parametric test for difference of means: event vs. non-event episodes[a]				
22	Mean returns difference (event > non-event)	0.11%	0.07%	0.08%	0.13%
23	Student's t statistic	3.014	1.577	1.891	2.716
24	P=value of t-score (1-tail: event > non-event)	0.001	0.058	0.030	0.003
	Panel E: Nonparametric test for difference of distributions: event vs. non-event episodes				
25	Mann–Whitney U Z-score	2.852	1.278	1.468	3.016
26	P-value of Z-score (1-tail: event > non-event)	0.009	0.101	0.071	0.001
	Panel F: Bootstrap test for difference of all event episode returns versus cumulative returns for the run-up				
27	Bootstrap p (1-tail, event > run-up)	0.009	0.042	0.049	0.010

[a]The Levene tests of the equality of variances between event and non–event episodes revealed insignificant differences for the returns series, except for the second tercile. Therefore, our t-test for the railway returns assumes equal variances for all series, except the second tercile.

Table 6. *Episode returns to railways only, breakdown by size terciles*

This table presents the cumulative event episode returns (CER) for 18 episodes for the market composite portfolio and for firms segmented by region of predominant activity. Size terciles are rebalanced daily. The test p-values are based on bootstrap analysis comparing the CERs against the distribution of returns over the entire run-up.

Row	Event period and legislation	All railways	First tercile (smallest)	Second tercile	Third tercile (largest)
	Number of securities	31	11	10	10
1	5–15 Feb. 1844: BCA, RA	−1.38%	0.78%	−1.94%	−1.45%
2	4–8 Mar. 1844: JSCA, RA	3.08%**	4.34%***	3.75%**	2.65%*
3	18 Apr. − 17 May 1844: RA	2.90%	6.12%*	0.76%	3.26%
4	20–24 June 1844: RA	0.32%	−0.12%	0.11%	0.46%
5	28 June − 13 July 1844: BCA, JSCA, RA	0.76%	1.65%	0.10%	0.88%
6	18–25 July 1844: BCA, JSCA, RA	3.08%*	1.97%	1.88%	3.66%*
7	1–13 Aug. 1844: RA	−0.15%	1.45%	1.03%	−0.80%
8	31 Aug. − 7 Sep. 1844: BCA, JSCA	2.93%*	1.71%	2.98%*	3.08%*
9	29 Nov. − 3 Dec. 1844: RB	1.06%	1.30%	1.61%	0.86%
10	30 Dec. 1844 − 2 Jan.1845: RB	1.26%	2.30%**	1.50%	1.04%
11	13–20 Jan. 1845: RB	4.94%**	1.00%	4.89%***	5.41%**
12	23–27 Jan. 1845: RB	−0.02%	0.70%	0.80%	−0.43%
13	30 Jan. − 29 Mar. 1845: CCC	9.01%	4.36%	6.88%	10.35%
14	3–17 Apr. 1845: CCC, RB	0.39%	1.24%	0.83%	0.12%
15	6–12 May 1845: RB	−0.41%	−0.45%	−0.35%	−0.43%
16	26 May − 2 June 1845: CL, RB	7.69%***	1.36%	5.58%***	9.12%***
17	10–13 June 1845: CL, RB	0.94%	0.59%	1.50%	0.77%
18	10–14 July 1845: RB	0.82%	−0.73%	0.03%	1.27%

Notes:

1. Significance level of a two-tailed test is indicated as follows: *p<0.1; **p<0.05; ***p<0.01.

2. The legislation is coded as follows: BCA (Bank Charter Act), RA (Railway Act), JSCA (Joint-Stock Companies Act), RB (recommendations by Board of Trade Select Committee of Railways regarding pending petitions for charters), CCC (Companies Clauses Consolidation Act), CL (proposals for repeal of the Corn Laws).

Table 7. *Leading railway consolidators in the South and Midlands regions of Britain, 1844*
This table presents the system size (miles of operating track) and cumulative return during the run-up for six prominent consolidators of railways during 1844 for the two regions that displayed the largest returns, the South and Midlands as determined in Table 4.

Railway	Region	Miles of operating track	Cumulative event return during the run-up
London & Southwestern	South	92.75	14%
Eastern Counties		85.75	74%
South–Eastern		89.5	97%
Great Western	Midlands	230.25	101%
London & Birmingham		128	30%
Midland		178.5	73%
All railways		Mean 33.5[a]	Mean 37.2%[b]
		Median 25.0	

Source: Authors' table based on data in Tuck (1845) and Lewin ([1936] 1968 p. 5).
[a]Average track mileage for 54 railways listed in Tuck (1845). Standard deviation of that sample was 26 miles.
[b]Average for the 31 railway securities in our sample. See Table 3, line 16.

Two findings help to illuminate why size mattered. First, most incumbent railways were larger than new entrants and were active acquirers. We examined Tuck's *Railway Shareholder's Manual* (1845) for evidence of acquisition activity in pursuit of consolidation and size. Of the 54 firms that Tuck surveyed, 60 percent were involved in purchasing, selling, or leasing properties in 1844. These transactions were heavily concentrated in the South and Midlands regions.[17] Second, the distribution of railways by system size was highly asymmetric. Lewin ([1936] 1968, p. 5) lists the largest systems that had emerged by the end of 1844. Table 7 gives railways' system size in 1844 and CER for the entire run-up compared to the central tendencies for all railways. These large systems towered in size over the rest of the industry, especially in the Midlands region. If miles of operating track is any indication of market power, then leading consolidators could influence prices and quality of service and could discipline competitors. The variance in CERs among large systems invites further research on the institutional aspects of system competition in 1844–5.

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[17] For instance, one of the iconic consolidators of local railways was George Hudson, who led the Midland System. In 1844, the Midland 'amalgamated' three other lines: Midland Counties Railway, North Midland Railway, and Birmingham and Derby Railway to form the second-largest system among British railways, with 178.5 miles of track. In addition, Bailey (1995, pp. 39–40) notes that Hudson had a material shareholding interest in the Newcastle and Darlington Junction Railway with which Hudson planned to develop a new line from the North region to London, in partnership with Robert Stephenson, the rival of Brunel.

As a final aspect of our returns analysis, we assessed two factors that generated comments in contemporary media as possible influences on railway returns: changes in monetary policy (indicated by Bank Rate and reserves) which the Bank Charter Act stimulated, and changes in grain prices. In a regression analysis, we found that neither of these factors was significant in explaining equity returns during the run-up, and, for brevity, are not treated in more detail here.[18]

VII

In conclusion, this study found that significant positive cumulative event episode returns are associated with developing laws to liberalize the British economy during Britain's railway run-up of 1844–5. These are the first empirical findings to establish an association between liberalizing events and equity returns during this run-up.

We examined returns across five industry sectors. Our findings confirm previous research that the stock market run-up was decidedly a *railway* phenomenon. Liberalizing episodes were associated with more than half of the entire run-up for railways. During five pivotal regulatory episodes, the CERs to railways were significantly positive.

This study is the first to report findings of positive and significant CERs associated with the advent of specific legislative initiatives, including the Joint-Stock Companies Act, the Corn Laws repeal, and the revelation of government policy favoring incumbent railroads during the review of charter petitions. We hypothesized that these legislative initiatives would reduce agency costs, reduce regulatory uncertainty, promote gains from industry consolidation, or potentially increase revenues through free trade.

Which kinds of railways benefited more from liberalization? This study is the first to report material differences among railways based on size and region of operation. Large size and operations in the Midlands and South regions were associated with the largest returns during liberalizing event episodes. Examination of a subsample of these firms suggested institutional rationales for these effects: actions of the Board of Trade and a Select Committee in Parliament favored the expansion of incumbent firms for whom the advantages of size, cumulative experience and preemption could yield competitive advantages.

The disparate returns by size and region suggest that the institutional background to Britain's railway boom of the 1840s is a potentially rich subject for future research. How did the competitive posture of the railways position them for competition in the newly liberalizing economy? And how did the railways seek to influence the emerging legislation? In this study, we recounted the active opposition of the railway operators to the early version of the Railway Act. News media reported the participation of Members of Parliament as directors and investors in railway

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[18] We refer the interested reader to our discussion of the analysis and test results in Appendix 4, posted online (see note 14).

companies, a detail that has received less scrutiny from researchers. How did the stock run-up affect the thinking of Members of Parliament and their leaders? Whereas this study implies that changes in government policy affected financial markets during the run-up, to what extent did feedback from financial markets to government affect policymaking? Finally, if, as Shiller (2019) argues, run-ups are associated with new narratives laden with investor sentiment, how did the liberalizing reforms affect the buoyant sentiment with which the railway run-up is associated?

Supplementary material

To view supplementary material for this article, please visit https://doi.org/10.1017/S0968565024000052

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