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Squeezing the bears: cornering risk and limits on arbitrage during the 'British bicycle mania', 1896–8†

By WILLIAM QUINN*

This article examines the extent to which Victorian investors were short-sale constrained. While previous research suggests that there were relatively few limits on arbitrage, this article argues that short-sales of stocks outside the Official List were indirectly constrained by the risk of being cornered. Evidence for this hypothesis comes from three corners in cycle company shares which occurred in 1896–7, two of which resulted in substantial losses for short-sellers. Legal efforts to retrieve funds lost in a corner were unsuccessful, and the court proceedings reveal a widespread contempt for short-sellers, or 'bears', among the general public. Consistent with the hypothesis that these episodes affected the market, this study's findings show that cycle companies for which cornering risk was greater experienced disproportionately lower returns during a subsequent crash in the market for cycle shares. This evidence suggests that, under certain circumstances, short-selling shares in Britain prior to 1900 could have been much riskier than previously thought.

In financial markets, a corner occurs when a market manipulator gains control of the supply of a particular equity, and thereby forces an arbitrary price on short-sellers contractually obliged to obtain these shares. When done successfully, this can result in heavy losses for short-sellers.[1] If the probability of being cornered is high, traders will be reluctant to short-sell, limiting their ability to profit by identifying overpriced stock. This can theoretically result in mispricing, with shares remaining overvalued despite the reservations of a significant number of informed investors.[2]

Several qualitative sources indicate that investors in nineteenth-century Britain were aware of the possibility of a corner, and advice columns cited cornering risk as a reason for non-specialists to avoid short-selling (then referred to as 'speculating for the fall').[3] Extant literature, however, suggests that British stock markets were significantly less vulnerable to corners than other stock markets in the same era,

*Author's Affiliation: Queen's Management School and Queen's University Centre for Economic History, Queen's University of Belfast.

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[1] Allen, Litov, and Mei, 'Large investors'; Jarrow, 'Market manipulation'.

[2] Jones and Lamont, 'Short-sale constraints'; Scheinkman and Xiong, 'Overconfidence'.

[3] Aytoun, *Glenmutchkin Railway*; 'Hints to small investors by a finance expert', *Bath Chronicle*, 1 Oct. 1896.

particularly those in the US.[4] Partly because of this, British stock markets have often been thought of as more friendly towards short-sellers, and potentially more efficient as a result.[5]

This article explores this subject by examining the effect of cornering risk on the shares of bicycle companies during the 'British bicycle mania' of 1896–8, a promotion boom that was accompanied by a substantial asset price reversal. Since almost all of these shares traded on the Special Settlement sections of the London and Birmingham Stock Exchanges, they were exempt from the listing rules that typically made cornering difficult. Consequently, three corners occurred in bicycle company shares during this period, two of which resulted in heavy losses for short-sellers. A combination of qualitative and quantitative evidence is used to argue that these corners, and the risk of another corner occurring, created a disincentive to short-sell, prolonging the boom and slowing the downward correction of share prices in the aftermath of the crash.

The first section of the article briefly outlines the existing literature on corners and short-sale constraints and describes the structure of the London and Birmingham Stock Exchanges. The second section describes the events of the bicycle mania. Since the financial aspects of the British bicycle mania have attracted little previous research, the extent of the reversal is quantified using hand-collected share price and dividend data from contemporary newspapers and *Stock Exchange Yearbooks*.[6] Cycle share prices are found to have risen by over 200 per cent in the early months of 1896, and remained at a relatively high level until March 1897. This boom was accompanied by the promotion of many new cycle firms, with 363 established in 1896 and another 238 during the first half of 1897. This was followed by a crash, with cycle shares losing 76 per cent of their peak value by the end of 1898. The financial press appears to have been aware that a crash was imminent, repeatedly advising investors to sell cycle shares during the first half of 1897. Interestingly, however, these articles never explicitly recommended short-selling cycle shares.

The remainder of the article develops the argument that the risk of a corner in cycle shares temporarily prevented a downward market correction. The third section outlines the events of the three corners and the subsequent High Court case. The scale of losses, or, in the case of the third corner, potential losses, were substantial enough that an investor would have accounted for the possibility of a corner when deciding how short a position to take in cycle shares.

The fourth section uses time-series and cross-sectional data to investigate the effect of corners on the overall market for cycle shares. Corners that imposed losses on short-sellers are found to have been followed by higher returns than those experienced in the period prior to the corner, while the cancellation of the third corner was followed by a period of relatively low returns. This finding is supported by structural break tests, which show that the most severe corner corresponds with

[4] Hannah, 'Governance', p. 661; Kynaston, 'London Stock Exchange', p. 157; Michie, *London and New York*, pp. 266–7.

[5] Chabot and Kurz, 'Foreign bias', p. 1064; Harrison, '300-year-old writings'.

[6] Previous work on the cycle mania includes Amini, Lei, and Toms, 'Accessing capital markets'; Harrison, 'Competitiveness'; idem, 'Joint-stock company flotation'; Lloyd-Jones and Lewis, *Raleigh*; Millward, 'Cycle trade'.

a structural break in both the trend and level of cycle share prices. Finally, cross-sectional regression analysis finds that firms which were most vulnerable to a corner experienced disproportionately negative returns during the crash of cycle shares in 1897. This is the case even when controlling for measures of firm performance, which suggests that the shares of these companies had been overvalued relative to other cycle firms.

This article contributes to the history of British equity markets by highlighting the difficulty of short-selling firms that were not on the Official List. Previous studies have emphasized the relative ease of short-selling on the London Stock Exchange at this time. Harrison has noted the breadth of the trade and its positive effect on market efficiency, while highlighting the ineffectiveness of legal restrictions, the last of which was rescinded in 1771.[7] Chabot and Kurz suggest that the short-sale restrictions that existed were less significant in Victorian markets than they are today.[8] Studies that have accounted for cornering risk have generally downplayed its importance. Michie and Kynaston have both noted the relative difficulty of engineering a corner in the London Stock Exchange when compared with the New York Stock Exchange in the same period, and Hannah suggests that this helped align share prices more closely with fundamental values.[9] By documenting several corners in shares trading in London as Special Settlements, this article suggests that this was not necessarily true of firms outside the Official List.

More generally, this research provides a rare insight into the nature of short-selling in an early stock exchange, a topic that has attracted little previous research. De Vries and van der Woude and Stringham have documented the emergence of short-selling as a strategy in the Netherlands in the seventeenth century, and subsequent attempts to ban the practice.[10] Murphy identifies the emerging market in derivatives in seventeenth-century Britain and a number of pamphlets criticizing the trade. She has also found evidence of a corner in the shares of a lead mining company.[11] Sloan has studied the history of short-selling on the New York Stock Exchange, emphasizing the extent of social opprobrium directed towards short-sellers. This unpopularity typically came from a combination of hostility from directors and shareholders, suspicions that short-sellers were spreading rumours to induce a fall in prices, and bitterness towards those who profited from economically damaging market crashes (a factor that explains why laws against short-selling often followed a fall in stock prices).[12] This article provides an example of how this opprobrium could result in unsympathetic hearings for short-sellers in court.

I

There is a small body of literature on the effect of market corners and squeezes on asset prices, much of which has been summarized by Putniņš.[13] A theoretical

[7] Harrison, '300-year-old writings'.
[8] Chabot and Kurz, 'Foreign bias', p. 1064.
[9] Hannah, 'Governance', p. 661; Kynaston, 'London Stock Exchange', p. 157; Michie, *London and New York*, pp. 266–7.
[10] de Vries and van der Woude, *First modern economy*; Stringham, 'Extralegal development'.
[11] Murphy, 'Trading options', pp. 17–19.
[12] Sloan, *Don't blame the shorts*.
[13] Putniņš, 'Market manipulation'.

framework is provided by Allen et al., Jarrow, Kyle, and Vila, all of whom model instances of large investors manipulating prices by monopolizing the supply of short-sold securities.[14] The model of Allen et al. is important because it shows how the threat of being cornered can act as a constraint on short-sales within a rational expectations framework. This model has three types of agent: the uninformed trader, the arbitrageur, and the market manipulator. The arbitrageur will only short-sell to correct the mispricing of the uninformed trader if the gains are sufficiently high to counteract the possibility of being cornered by the manipulator. Since the losses involved in a corner are potentially substantial, this can result in severe price distortions.[15] Specifically, all shares for which a corner was a realistic possibility could remain at prices above their fundamental values.

Theoretically, the effect on prices of a reduction in short-selling can depend on the market structure. In markets where short-selling implies the existence of margined longs, the presence of the longs counteracts the effect of the shorts, leading to an ambiguous effect on prices.[16] Short-sale restrictions thus may not have the effect predicted by Allen et al. However, short-selling in the 1890s British stock exchanges was generally naked, essentially consisting of a forward contract with a buyer, who was not necessarily leveraged.[17] One would therefore generally expect short-sale constraints to raise prices.

Experimental literature has found that restrictions on the ability to short-sell can raise prices in various market structures.[18] In a market structure where short-selling does not mitigate overpricing, such as that of Porter and Smith, overpricing can still be mitigated by futures markets similar to those on nineteenth-century British exchanges.[19] The evidence is mixed on whether short-selling simply lowers prices, or makes prices more likely to track fundamental values. Haruvy and Noussair and Veiga and Vorsatz both find that an increased ability to short-sell lowers prices regardless of the asset's true underlying value.[20] However, Hauser and Huber find a clear effect of increased efficiency.[21] The present study is unable to determine whether any observed overpricing was offset by underpricing in the Official List system, where cornering was more difficult. However, in either case, the probability of the price level rising above fundamental values is greater in the presence of constraints to short-sale.

There have been several case studies of corners in specific assets. Merrick et al. document a squeeze in the London bond market in 1998, and Jegadeesh and Jordan and Jordan examine the Salomon Brothers' corner of a Treasury note auction in 1991.[22] Allen et al. document 14 famous corners in the US market between 1863 and 1980, 10 of which were successful. They also investigate the

[14] Allen et al., 'Large investors'; Jarrow, 'Market manipulation'; Kyle, 'Theory'; Vila, 'Role of information'.
[15] Allen et al., 'Large investors', p. 648.
[16] Fostel and Geanakoplos, 'Leverage cycles'; Longstaff, 'Portfolio claustrophobia'; Brunnermeier and Pedersen, 'Market liquidity'.
[17] Kynaston, 'London Stock Exchange', p. 149.
[18] Ackert, Charupat, Church, and Deaves, 'Margin'; Fellner and Theissen, 'Short sale constraints'; Palan, 'Review', p. 577.
[19] Porter and Smith, 'Price bubbles'.
[20] Haruvy and Noussair, 'Effect of short selling'; Veiga and Vorsatz, 'Effect of short-selling'.
[21] Hauser and Huber, 'Short-selling constraints'.
[22] Merrick, Naik, and Yadav, 'Strategic trading behavior'; Jegadeesh, 'Treasury auction bids'; Jordan and Jordan, 'Salomon Brothers'.

share price patterns in the overall market around the periods in which a corner takes place, finding that corners do appear to have caused similar assets to become temporarily overpriced.[23] Jones and Lamont investigate a sample of companies that have tried to prevent short-sales on their stock, by some combination of legal threats, lawsuits, and market corners.[24] They find that such firms tend to have significantly lower subsequent returns. This suggests that shares had previously been temporarily overpriced as a result of efforts to constrain short-sales. Jones and Lamont do not, however, investigate whether these constraints have a similar effect on the overall market, where investors may be unaware *ex ante* of which firms will take action to punish short-sellers.

Cornering risk has often been present, to a greater or lesser extent, in historical stock markets: Chancellor states that corners are 'as old as stock markets themselves'.[25] De Pinto's 'Jeu d'actions en Hollande', published in 1771, describes 'actionistes' using corners to profit from inexperienced speculators.[26] Lefèvre describes several colourful examples of market manipulators engineering corners in nineteenth-century US stock markets.[27] In Britain, Murphy documents reports of partial corners in stock markets as early as the 1690s, when John Blunt appears to have profited by buying calls in the Estcourt's Lead Mine Company, in which he and his associates already owned a controlling stake.[28] Corners also feature prominently in contemporary fiction relating to the British railway mania of the 1840s.[29]

Generally, however, the London Stock Exchange of the nineteenth century has been considered one in which cornering shares was relatively difficult.[30] There were several reasons for this. Shares on London's Official List only needed to be cleared fortnightly, rather than daily, as was the case for the New York Stock Exchange.[31] Therefore, a partially cornered short-seller normally had more time in which to find the shares from someone other than the market manipulator. Furthermore, London's clearing system was centralized, and thus avoided the search frictions common in bilateral clearing (such as that of New York).[32] However, perhaps the most important barrier to cornering stocks was the 'two-thirds rule', under which no firm could progress to an Official Listing unless it had allotted two-thirds of its capital to the general public.[33] As a result, in order to corner a stock, one would need to buy a significant number of shares on the open market after it had been listed, thereby making the intention clear to any would-be short-sellers.

The two-thirds rule, however, only applied to firms on the Official List, which accounted for around half of the shares traded on the London Stock Exchange.[34] The remainder traded under the Special Settlement system, so called because

[23] Allen et al., 'Large investors'.
[24] Jones and Lamont, 'Short-sale constraints'.
[25] Chancellor, *Devil*, pp. 156, 170.
[26] de Pinto, 'Jeu d'actions', pp. 375–6.
[27] Lefèvre, *Reminiscences*.
[28] Murphy, 'Trading options', p. 17.
[29] Aytoun, *Glenmutchkin Railway*.
[30] Kynaston, 'London Stock Exchange', p. 157.
[31] Michie, *London and New York*, pp. 265–6.
[32] Michie, *London Stock Exchange*, pp. 77–8.
[33] Burhop, Chambers, and Cheffins, 'Regulating IPOs', p. 63.
[34] Hannah, 'Governance', p. 647.

stocks trading under it fixed a date for settlement of bargains that was outside the usual calendar. This section of the market was almost entirely unregulated: prior to 1909, the only requirement for a Special Settlement listing was that sufficient share certificates were ready for delivery. The denial of an application for a Special Settlement listing was extremely rare.[35] The intention of the system appears to have been to clear any trades that occurred before the issue was floated, after which firms would progress to the Official List.[36] However, a large number of firms never made this progression.

The remainder of this article investigates the effect of cornering risk in the Special Settlement market during the British bicycle mania of 1896–8. The widespread scepticism of the financial press towards the viability of cycle shares suggests that this was a situation in which informed investors would have wanted to short-sell, making this an ideal episode through which to investigate the subject. Furthermore, cornering was more than a theoretical possibility during this reversal: three corners occurred, one of which resulted in a public court case. As a result, the episode provides us with a rare insight into the operation, public perception, and legal status of short-sellers and market manipulators. The following section outlines the events of the bicycle mania.

II

Between 1890 and 1896, a succession of major technological innovations substantially increased the demand for British bicycles.[37] Bicycle production increased in response, with the number of British cycle companies in existence quadrupling between 1889 and 1897.[38] Cycle firms, most of which were based in and around Birmingham, took advantage of the boom of 1896 by going public, resulting in the successful promotion of £17.3 million worth of cycle firms in 1896 and a further £7.4 million in 1897.[39] By 1897 there was an oversupply problem in the trade, which was worsened by an exponential increase in the number of bicycles imported from the US.[40] The bicycle industry entered recession, and the number of Birmingham-based cycle firms fell by 54 per cent between 1896 and 1900.[41]

This boom-bust pattern was accompanied by an equivalent reversal in the prices of bicycle company shares. In order to quantify the reversal, a daily index of cycle share prices between the years 1895 and 1898 is developed, and supplemented with data on the firms' dividend payments. Share prices were hand-collected from the *Birmingham Daily Mail*, the *Birmingham Daily Post*, and the *Financial Times*, and dividends were obtained from *Stock Exchange Yearbooks*. For 1895, an average of the bid and ask prices of shares is used when traded prices were unavailable, but from 1896 onwards, the traded price is used. Further details on all of the index's constituents are included in online appendix table S1. The methodology used to calculate the index is similar to that of Le Bris and Hautcoeur, with returns weighted

[35] Burhop et al., 'Regulating IPOs', p. 64.
[36] Kynaston, 'London Stock Exchange', p. 157.
[37] Harrison, 'Competitiveness'; Rubinstein, 'Cycling'.
[38] Harrison, 'Competitiveness'.
[39] Harrison, 'Joint-stock company flotation'.
[40] Harrison, 'Competitiveness.
[41] Millward, 'Cycle trade'.

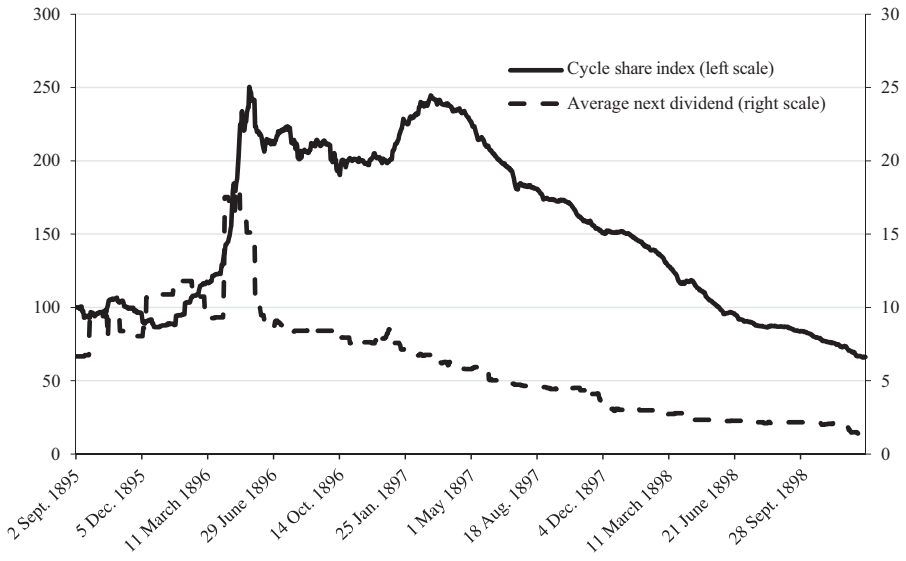

Figure 1. *Cycle share index vs. subsequent reported dividends, 1895–8*

Sources: Share prices obtained from *Birmingham Daily Post*, *Birmingham Daily Mail*, and the *Financial Times.* Dividends obtained from the *Stock Exchange Yearbook*, 1895–1900.

by price.[42] Following Grossman, market capitalization-weighted and unweighted indices were also calculated, but any differences between these indices were minor, and they are excluded for the sake of brevity.[43] No calls on capital occur during this time, and so no adjustments for this are necessary. Returns are thus calculated as:

$$\text{Index return at time t:} \quad R_t = \sum_{i=1}^{N} \left(w_{i,t} \times r_{i,t}\right) \tag{1}$$

with weighting $w_{i,t} = (p_{i,t-1}) / \sum_{i=1}^{N} (p_{i,t-1})$ and

$$r_{i,t} = \left[\left(p_{i,t} - p_{i,t-1}\right)\right] / \left[p_{i,t-1}\right)\right]$$

where N is the number of stocks and p_i is the price of stock i at time t.

The index at the first date, 2 September 1895, is set equal to 100. Each subsequent value of the index is calculated as:

$$I_t = I_{t-1} * (1 + R_t) \tag{2}$$

where I_t is the value of the index at time t and R_t is the price-weighted return between t–1 and t. The resulting index, alongside the companies' average subsequent dividend, is shown in figure 1. An initial run-up in prices in spring 1896 could arguably be seen as a response to the extremely high dividends paid

[42] Le Bris and Hautcoeur, 'Challenge'. As dividends are paid in proportion to par value, price is defined as the cost of one nominal pound of shares.

[43] Grossman, 'New indices'.

by a number of companies: an example of 'myopic rationality', whereby prices are consistent with a pricing model based on current dividends.[44] However, while prices subsequently fall in line with dividends for the remainder of 1896, there is a partial recovery between December 1896 and March 1897. This recovery, which involved many newly promoted companies, occurred despite dividends continuing to fall.

The vast majority of cycle shares traded on the Birmingham Stock Exchange, but there was considerable cross-listing, with around two-thirds also trading in London.[45] The structures of the two exchanges were essentially identical, with each having both an Official List of firms that went through the clearing process at fixed intervals, and a separate list of Special Settlement firms that did not.[46] The majority of cycle shares traded as Special Settlement only throughout their existence, with only 52 of 159 companies eventually progressing to the Official List.[47] However, very few progressed to the Official List until after the boom was over: between January 1896 and March 1897, when share prices began to fall, only four firms applied for an Official Listing in Birmingham, whereas 81 applied for a Special Settlement.[48] The reversal thus occurred almost entirely under the Special Settlement system.

Was the cycle share boom accompanied by an equivalent boom in the overall stock market? In order to answer this question, a price-weighted index of blue-chip firms between 1895 and 1897 is developed. It consists of the 30 largest firms by ordinary capital in 1898, as reported by Delargy and Kennedy.[49] Where share price data were incomplete or unavailable for one of these companies, the next-largest company was used. Daily prices are obtained from *The Times*, and the calculation method used is identical to that of the cycle share index. The resulting index, alongside the cycle share index for the same period, is shown in figure 2. It can be seen that the blue-chip index is relatively flat in this period, with modest positive returns and no clear association with the boom in cycle shares.

Share prices in the spring of 1897 were particularly high considering the rapid increase in the number of cycle corporations, as shown in table 1. Seventy cycle corporations were established in 1895, with a total nominal capital of £3.6 million; in 1896, 363 more were established with a total nominal capital of £27.3 million. The first half of 1897 saw a further 238 established, with a nominal capital of £12.1 million. Despite the obvious implications for the competitiveness of the market, share prices continued to increase into March 1897.

The high price of cycle shares was frequently referred to by the contemporary financial press. *Money: A Journal of Business and Finance* repeatedly warned against the buying of cycle shares from June 1896 onwards.[50] In particular, *Money* emphasized the substantial difference between public and private valuations of cycle firms, many of which went public at a substantial premium on the price their

[44] Campbell, 'Myopic rationality'.
[45] 'The cycle share market', *Financial Times*, 30 April 1897.
[46] Thomas, *Provincial stock exchanges*, p. 84.
[47] Ibid., p. 132.
[48] Wolfson Centre for Archival Research, Birmingham, Birmingham Stock Exchange, minutes, 1896–7.
[49] Delargy and Kennedy, 'Explaining Victorian entrepreneurship'.
[50] 'The cycle craze', *Money: A Journal of Business and Finance*, 13 June 1896.

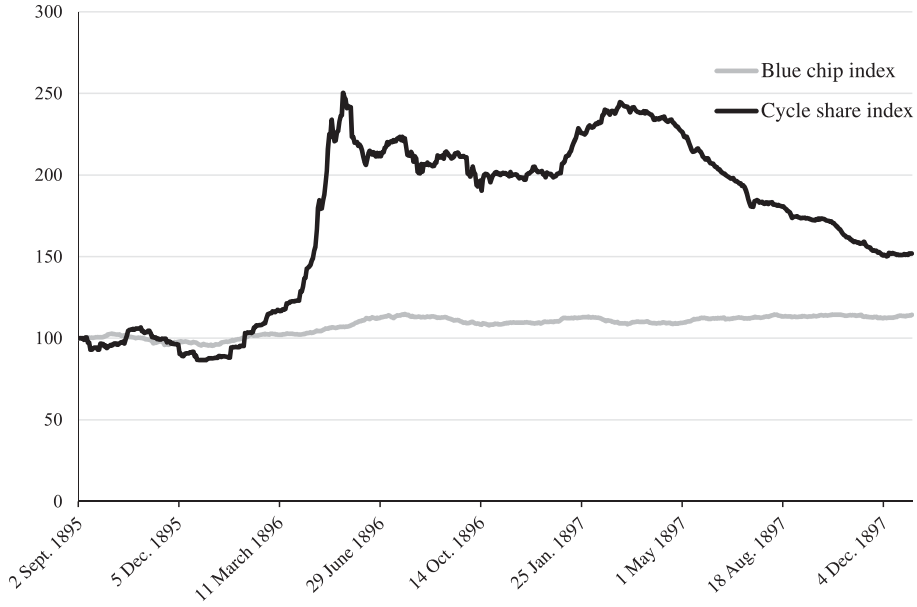

Figure 2. *Cycle share index vs. blue-chip index, 1895–7*
Sources: Birmingham Daily Post, *Birmingham Daily Mail*, *Financial Times*, and *The Times*.

Table 1. *Cycle corporation establishment, January 1895–June 1897*

		No. of companies established	*Average nominal capital (thousands of £)*	*Total nominal capital (thousands of £)*
1895	Q1	17	21.03	357.5
	Q2	12	15.21	182.5
	Q3	15	108.27	1,624.0
	Q4	26	56.77	1,476.1
1896	Q1	34	48.27	1,641.1
	Q2	94	147.31	13,847.2
	Q3	96	55.38	5,316.6
	Q4	139	46.44	6,454.6
1897	Q1	156	47.24	7,370.0
	Q2	82	58.09	4,763.6
Total		671	64.13	43,033.2

Source: Birch's Manual of Cycle Companies 1897.

owners had received from promoters.[51] The *Economist* was particularly critical of the prospectuses issued by these promoters, stating at one point that they appeared to have been imbued with 'a very robust faith in the gullibility of the average investor'.[52] The *Financial Times* published an article on 1 May 1897 stating that 'the majority of companies are over-capitalised', previous dividends generally indicate 'a very precarious investment', and 'estimated profits are based upon results that

[51] 'The cycle cataclysm', *Money: A Journal of Business and Finance*, 20 June 1896.
[52] 'Cycle company promotion', *Economist*, 27 June 1896.

are not likely to be maintained'. The conclusion, said to be shared by cycle makers generally, was that 'the end of the present year will see disaster'.[53]

The fact that the high price level was so well documented poses the question of why cycle shares were not heavily short-sold, and of why the financial press did not recommend that investors do so. Cornering risk may provide the answer, as in the spring of 1897 short-sellers had already lost money in a cycle company corner, which was soon followed by two additional corners. The following section describes these events.

III

The three corners during the bicycle mania were the Bagot Tyre corner of November 1896 to January 1897, the James Cycle Company corner of July 1897, and the Tubes (America) corner, which also occurred in July 1897. In this section, the details of these episodes are reconstructed from a combination of shareholder records, contemporary news media, and specialist publications, particularly *Cycling Magazine*, which ran a weekly section discussing developments in the market for cycle shares. Ernest Hooley reports having also engineered a corner in the shares of Humber (Portugal) in the spring of 1896, but Hooley was not a reliable source, and the press at the time of the supposed corner did not record any such event having occurred.[54] There were also some corners in other industries, the most high-profile of which was in the shares of the Lady Hampton Company, a mining venture, in November 1896.[55] However, the author is unaware of any other corners in cycle shares occurring at this time.

The Bagot Pneumatic Tyre Company was established in September 1896 as part of a wave of new cycle, tube, and tyre promotions. The purpose of the company appears to have been to hold patents and thereby profit from royalties, rather than to manufacture tyres itself.[56] The company's head offices were located in London, and its shares were traded by Special Settlement on the London and Birmingham Stock Exchanges.[57] While the nominal capital was 200,000 shares of £1 each, only 20,000 of these were applied for by the general public. Rather than abort the company's establishment, the directors took most of the outstanding shares, and proceeded to allotment.[58] The company wound up in 1902, having not paid a dividend at any stage, with company directors blaming the unexpected legal opposition of the Dunlop Company for the company's demise.[59]

The corner originated in October 1896. Following allotment, Hewitt Myring, the promoter, immediately issued orders to buy and sell stock on the exchanges at £1.25. Since this price was above the par value of £1, at which the stock was heavily

[53] 'The cycle outlook', *Financial Times*, 1 May 1897.
[54] Hooley, *Hooley's confessions*, pp. 74–9.
[55] 'A stock exchange "corner"', *Economist*, 28 Nov. 1896.
[56] 'Queen's Bench Division: Jackson and others v. Hamlyn', *The Times*, 11 Aug. 1897.
[57] TNA, BT31 Board of Trade, Companies Registration Office, files of dissolved companies, Bagot Pneumatic Tyre BT31 file, 'Notice of the situation of registered office', 14 Oct. 1896; 'The cycle share market', *Financial Times*, 2 Jan. 1897.
[58] 'Queen's Bench Division: Jackson and others v. Hamlyn', *The Times*, 7 Aug. 1897.
[59] TNA, BT31 Board of Trade, Companies Registration Office, files of dissolved companies, Bagot Pneumatic Tyre BT31 file, 'Special resolution of the Bagot Pneumatic Tyre Company', 17 May 1902; *Stock Exchange Yearbook* (1900), p. 1372; 'Queen's Bench Division: Jackson and others v. Hamlyn', *The Times*, 10 Aug. 1897.

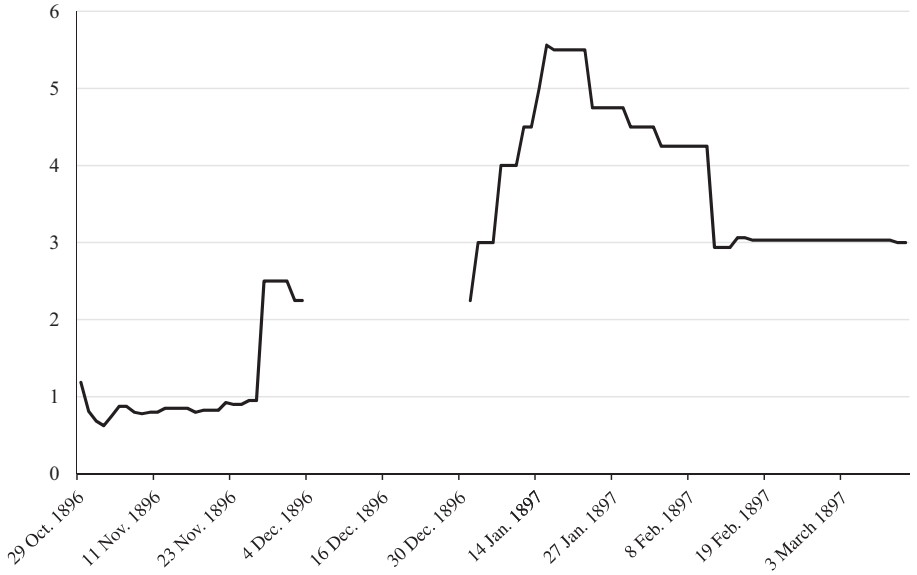

Figure 3. *Bagots Pneumatic Tyre share price (£), October 1896–March 1897*
Source: Financial Times.

undersubscribed, Myring found considerably more sellers than buyers. Between 7,000 and 10,000 were bought on the market, while Myring struck a deal with the holders of another 7,500 to pool their shares for six months. It was alleged that he then went to the market to induce traders to short-sell, but no evidence of this was produced in court.[60] By January, only 1,766 shares were held by the general public.[61] Shareholder records suggest that 8,203 shares had been short-sold, so investors short of the shares would have needed to buy most of the required shares either from Myring or from the investors involved in the pooling operation.[62]

The effect of the corner on the company's share price is shown in figure 3, which plots the daily share price of Bagot Tyre stock as reported in the *Financial Times*. The shares open at a small premium, as a result of Myring instructing his brokers to put and call at £1.25. Thereafter, the price is temporarily driven down by sales, which Myring knew to be mostly short-sales because they were sold in much larger blocks than had been allotted. The effect of the pooling arrangement is then apparent from the steep rise in prices at the end of November 1896. Subsequently, shares are so difficult to find that they disappear from the market altogether until January 1897. The price remains notably high until March, at which point the *Financial Times* stopped reporting any trade in the shares, suggesting that other short-sellers were still attempting to close their positions at this stage.

[60] 'Queen's Bench Division: Jackson and others v. Hamlyn', *The Times*, 7 Aug. 1897.
[61] 'Queen's Bench Division: Jackson and others v. Hamlyn', *The Times*, 10 Aug. 1897.
[62] TNA, BT31 Board of Trade, Companies Registration Office, files of dissolved companies, Bagot Pneumatic Tyre BT31 file, 'Summary of capital and shares', 5 March 1897.

The 1900 *Stock Exchange Yearbook* reports that the company had not at that stage paid a dividend, and the company was dissolved in 1902.[63] It therefore appears that the share price movements had no fundamentals-based justification, and were driven entirely by market manipulation. Even if they did not know the extent to which the company was unprofitable, traders would have expected the true value of the shares to be considerably lower than par in November 1896, since they were undersubscribed by a very wide margin. Theoretically, this was an excellent opportunity to short-sell, but those who did suffered heavy losses. The extent of these losses is evident from the record of investors, which details all share transfers that took place in January and February of 1897.[64] It can be assumed that all of these transfers were to cornered short-sellers, because the firm was trading at such a dramatically inflated price that it is highly unlikely that anyone would buy its shares for any other reason. In total, 8,203 shares were sold between 16 January and 9 February. Assuming that the prices paid were those quoted in the *Financial Times*, the total losses to short-sellers would have amounted to £28,398, on shares with a par value of £8,203. Media coverage suggests that short-sellers struggled to buy shares even at the quoted price, however, so the true losses were potentially even greater.[65]

This incident resulted in a High Court case, which was tried at the Queen's Bench Division in August 1897. The defendant, Mr Hamlyn, was a Dublin-based private investor who suffered substantial losses in the corner. The plaintiffs were his brokers, who resorted to taking him to court after he refused to pay for his losses. The details of this case are sufficiently informative to warrant describing in full.

On 22 October 1896, Hamlyn agreed to sell 200 shares at £1.16, for delivery in January 1897. Since he did not own these shares, this constituted a naked short-sale. His barrister insisted in court that he had in fact intended to apply for shares at initial public offering (IPO), and sell these on the market at a premium, but could not do so because he 'did not have a cheque' on hand. Subsequently on 6 January 1897, the date for which delivery had been arranged, Hamlyn's brokers could not find any shares on the market.[66]

Buying-in day was 18 January 1897, after which the brokers would incur personal liability for breach of contract. On 9 January, the brokers secured 100 shares from a jobber at the price of £4.50, ignoring Hamlyn's instructions to pay no more than £4.25. They continued to offer increasingly high prices for shares on the open market, peaking on 16 January when their offer of £5.50 failed to obtain any shares. When the 18 January deadline arrived, they were still short 100 shares. They then resorted to buying from Myring, who, having an effective monopoly, sold at £21 per share. The total paid for the 200 shares was £2,550, to be delivered at a price of £231.25, for a loss of £2,318.75. To put this loss in context, Hamlyn's barrister noted that, had he

[63] *Stock Exchange Yearbook* (1900), p. 1372; TNA, BT31 Files, The Bagot Pneumatic Tyre Company Limited, 'Special resolution', 5 March 1897.

[64] TNA, BT31 Board of Trade, Companies Registration Office, files of dissolved companies, Bagot Pneumatic Tyre BT31 file, 'Summary of capital and shares', 5 March 1897.

[65] 'Queen's Bench Division: Jackson and others v. Hamlyn', *The Times*, 6 Aug. 1897.

[66] Ibid.

succeeded in obtaining the shares at allotment, the profit would have been only £26.[67]

The court case hinged on why the brokers had accepted such an extortionate price on behalf of Hamlyn. Hamlyn, suspecting that the brokers had been colluding with Myring in a 'swindle', refused to deliver payment to the brokers for the shares. His stockbrokers sued, arguing that they needed to close the position and, having already attempted several times to buy shares on the exchanges, were not obligated to seek out various individual shareholders to find a better deal.

Despite the judge's recommendation, no settlement was reached and the case was tried. Hamlyn also issued a counter-claim against Myring for fraud, although this claim was later withdrawn. Hamlyn presented no direct evidence of any collusion, and after a four-day trial, the jury ruled in favour of the stockbrokers, ordering him to pay the full cost of the shares plus legal costs. While they conceded that no fraud had been proven, they 'desired to express their strong disapproval of the course taken by Myring and the directors of his company'.[68] Hamlyn was therefore forced to pay his brokers in full, with the resulting losses compounded by a prolonged, expensive, and unsuccessful legal battle. *The Times* covered this court case in its entirety, and the verdict was also reported by a wide range of local and national newspapers.[69] The episode is therefore likely to have made investors wary of short-selling shares, particularly those of newly established cycle companies. *Cycling Magazine*, for this reason, welcomed the verdict, stating that 'there will be less "bearing" done after one or two sharp lessons of this kind'.[70]

As well as deterring short-sales, this incident may have contributed to overpricing by encouraging uninformed investment in cycle shares. Table 2 shows the occupations, as reported in the company's shareholder register, of all investors who sold Bagot Tyre shares while their price was inflated by the corner. Many of these investors were likely to have been involved in Myring's pooling operation. Notably, the vast majority of gains from the corner accrued to non-specialist investors.[71] 'Gentlemen' and members of the armed forces were the main beneficiaries, and listed occupations ranged from 'hotel keeper' to 'theological student'. In contrast, bankers, stock brokers, directors, agents, and industry insiders accounted for just 5.48% of cornering profits.

This is relevant for two reasons. First, stories of members of the public making extravagant gains are likely to encourage other non-professionals to invest in cycle shares. The role of simple, colourful stories in spurring speculative investment has been emphasized by Case and Shiller.[72] Second, holders of shares in other companies are likely to have become more inclined to join pooling operations. This may have been a factor in the development of the two further corners that took place in 1897, both of which required some small shareholders to commit to a

[67] Ibid.

[68] 'Queen's Bench Division: Jackson and others v. Hamlyn', *The Times*, 11 Aug. 1897.

[69] Articles were published in *The Morning Post*, *Freeman's Journal*, *Midland Daily Telegraph*, the *Standard*, and the *Liverpool Mercury*.

[70] 'Financial', *Cycling Magazine*, 21 Aug. 1897.

[71] TNA, BT31 Board of Trade, Companies Registration Office, files of dissolved companies, Bagot Pneumatic Tyre BT31 file, 'Summary of capital and shares', 5 March 1897.

[72] Case and Shiller, 'Bubble'.

Table 2. *Occupations of Bagot Tyre corner beneficiaries*

Occupation	*Profits (£)*	*% of total profits*
Agent	262.5	0.86
Armed forces	6,961.25	22.86
Banker	93.75	0.31
Broker	468.75	1.54
Clerk or manager	1,106.25	3.63
Cycle maker	375	1.23
Director	468.75	1.54
Gentleman/esquire	7,723.75	25.37
Manufacturer	600	1.97
Merchant	3,817.5	12.54
Skilled trade	3,037.5	9.98
Unknown	4,130	13.56
Woman	1,403.75	4.61
Total	30,448.75	100.00

Source: TNA, BT31 Board of Trade, Companies Registration Office, files of dissolved companies, Bagot Pneumatic Tyre BT31 file, 'Summary of capital and shares', 5 March 1897.

similar arrangement. This, in turn, increases the cornering risk for short-sellers to account for.

The corner of James Cycle Company shares differed from that of the Bagot Tyre Company in that it involved a highly profitable and successful company. The firm was registered in May 1897 with a nominal capital of £50,000, issued in shares of £1 each. It paid a dividend of 10 per cent per annum for the six months to November 1897, 7.5 per cent for 1897–8, and 2.5 per cent for 1898–9; modest sums in isolation, but respectable in an era in which most cycle firms paid no dividend at all and many declared bankruptcy.[73] The firm later moved into motorcycle production, continuing business until the 1960s.

The corner was engineered by the company director, Harry James. The *Birmingham Daily Post* reported that it was brought about 'in much the same way' as the Bagot Tyre corner of the previous year.[74] The shares went to market in June 1897, a period of rapidly falling cycle share prices, and with almost no cycle companies trading above par, traders short-sold the company accordingly. James responded by placing large orders to buy in an effort to prop up the company's share price.

The company's share price, as reported in the *Financial Times*, is shown in figure 4. The initial price of around £1.25 is consistent with the dividends paid by the company over the following 18 months, so *ex post* it was not an ideal opportunity to short-sell. The price initially falls slightly before rapidly rising to a peak of £2 10s. on 23 July. It is unclear whether this is a consequence of manipulators buying all available stock, short-sellers desperately trying to cover their positions, or some combination of both. *Cycling Magazine* reported at this stage that 'some bears got nicely cornered over shares in James Ltd. on Monday afternoon [19 July]'.[75] The Birmingham Stock Exchange responded by suspending all trading in the shares

[73] *Stock Exchange Yearbook* (1900), p. 1528.
[74] *Birmingham Daily Post*, 21 Dec. 1897.
[75] 'Financial', *Cycling Magazine*, 24 July 1897.

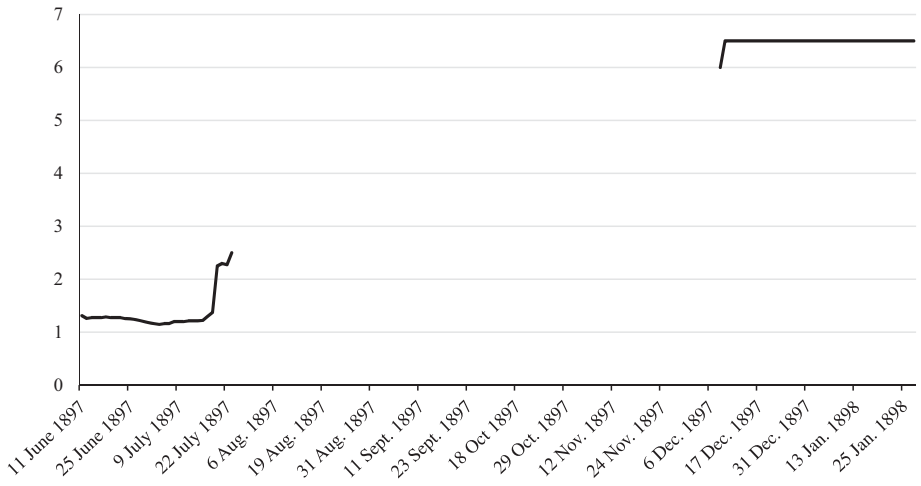

Figure 4. *James Cycle Ltd. share price (£), June 1897–January 1898*
Source: Financial Times.

pending the settlement of the matter.[76] The shares thereafter did not trade for four-and-a-half months. Shares were briefly offered on the exchanges at £6–£6.5 each in December 1897 and January 1898, before once again disappearing from the *Financial Times* price list.

The settlement was eventually made on 10 January 1898 and decreed that, James having withdrawn a controversial circular, the short-sellers must fulfil their contracts and find the shares from somewhere. The 'buying-in' rule was suspended, however, and they therefore had an indefinite period to procure the shares.[77] A stand-off followed, with the short-sellers refusing to offer more than £3 per share and James refusing to accept less than £8 per share. With James apparently considering legal action, the stand-off ended in July 1898 when the short-sellers managed to buy shares from elsewhere at £4 each. They were, in total, 1,150 shares short, so assuming the shares were short-sold at the opening-day price of £1.25, the total loss would have been £3,162.50.[78] The maximum potential gain from the short-sell, if the shares had fallen to a price of £0.05 by the closing date, would have been £1,380. The realistic prospects for profit were much smaller, however, given the timeframe involved and the standing of the company. In contrast, if the corner had been entirely successful, the losses at £8 per share would have amounted to £7,762 10s. This reaffirms the severe tail risk involved in short-selling a stock when there is some risk of being cornered.

James, like Myring in the Bagot Tyre case, did not manage to corner the market entirely, and is likely to have also suffered heavy losses as a result.[79] The profit was made by those who had sold their shares to James in the first instance and, especially, by those who sold shares to the short-sellers in July 1898. The heavy losses accrued by short-sellers, however, are still likely to have acted as a disincentive

[76] 'Financial', *Cycling Magazine*, 31 July 1897.
[77] 'Financial', *Cycling Magazine*, 15 Jan. 1898.
[78] 'Financial', *Cycling Magazine*, 23 July 1898.
[79] 'Financial', *Cycling Magazine*, 30 July 1898.

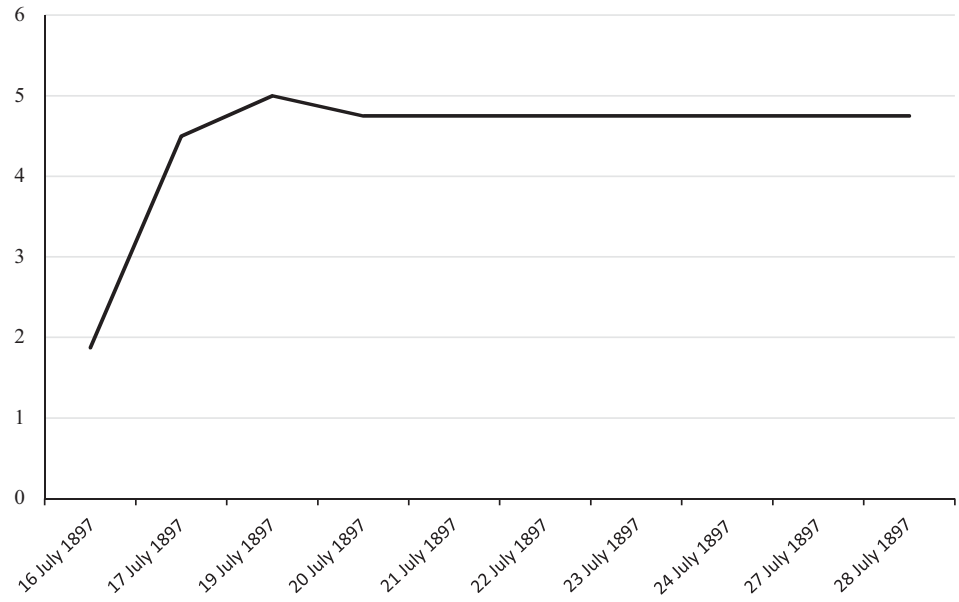

Figure 5. *Tubes (America) share price (£), July 1897*
Source: Financial Times.

to short-sell stock in general. *Cycling Magazine*, once again, was satisfied by the outcome, writing that, 'if it only teaches speculators to be more careful, the James "bear squeeze" will not have been in vain'.[80]

Tubes (America) Ltd was a company floated in the UK in order to acquire three American tube companies. The nominal capital was £350,000 in shares of £1 each, 203,163 of which were put forward for public subscription. The company was heavily undersubscribed, and instead of abandoning the project the directors decided to take on the remaining shares themselves.[81] Since undersubscription suggested that shares were overvalued at par, several brokers proceeded to short-sell. Shares of this company, however, were held by a small network of investors: over half were in the hands of American directors, who were locked in for 12 months, with many more in the hands of close associates and the company's promoters. Orders were placed to buy, and some 'bears' entered into an agreement to sell shares they did not yet own.[82]

Figure 5 shows the company's share price as reported in the *Financial Times* for July 1897, the only month in which the firm was listed. In an effort to close their positions, short-sellers placed bids at up to £5 per £1 share, but after 12 days these offers were still unsuccessful. At this stage the only potential course of action was to buy from the company directors that had engineered the corner, and who were therefore likely to charge extremely high prices. *Cycling Magazine* suggested they would have to pay £10 or more per share in order to close their position, while the

[80] 'Financial', *Cycling Magazine*, 30 July 1898.
[81] 'Financial', *Cycling Magazine*, 5 March 1897.
[82] 'Financial', *Cycling Magazine*, 24 July 1897.

London Daily News simply stated that they would probably be made to pay 'through the nose'.[83]

As with the James corner, the Birmingham Stock Exchange barred the shares from trading in an effort to prevent the rig from having further effect, and arranged for a settlement to take place.[84] In the event no such settlement was necessary, as the establishment of the company was aborted in March 1898. All trades were subsequently cancelled and money returned to subscribers. The short-sellers therefore did not experience a loss.[85]

The striking feature of the coverage of this incident is the level of ill-feeling directed towards the 'bears' that short-sold the stock. The *Edinburgh Evening News* described the short-sellers as 'reckless' and praised those cornering the stock for 'making good use of the opportunity'.[86] The *London Daily News* described the 'bears' as having been 'caught in their own trap', hoping that they would be 'taught a lesson'.[87] *Cycling Magazine* stated that, 'A few similar corners in the shares of a few other concerns would, we have not the slightest doubt, be extremely welcome to the general body of investors just now'.[88] The episode was not covered especially widely, but those publications that did report it were in agreement that short-sellers who lost money were getting what they deserved.

While no losses eventually occurred, this only became clear eight months after the corner, during which time investors short of Tubes (America) stock would have expected to suffer heavy losses. Occurring simultaneously with the James corner, this would have served to emphasize further the tail risk inherent in short-selling shares that were vulnerable to a corner.

IV

Numerous contemporary press reports suggested that the cornering incidents discussed in the previous section would discourage further short-sales.[89] Was this really the case? This section seeks to answer this question by investigating the price patterns in other cycle shares during the periods in which corners occurred. A simple methodology, used by Allen et al., is to compare patterns of trading in other shares before, during, and after cornering incidents.[90] Intuitively, one would expect that, if a corner was a disincentive to short-sell, share price movements would be more positive in the period after a cornering incident than they had been in the period before.

For each of the three corners, three periods are identified: a pre-corner period of 55 trading days, the 10 days immediately preceding the corner, and the 10 days after the corner occurred. Corners are dated to the point at which share prices suddenly peaked, since this is typically when the presence of cornered short-sellers

[83] 'Financial', *Cycling Magazine*, 24 July 1897; 'Birmingham cycle, tyre and tube market: a "corner" in tubes', *London Daily News*, 19 July 1897.
[84] 'Financial', *Cycling Magazine*, 31 July 1897.
[85] 'Financial', *Cycling Magazine*, 5 March 1897.
[86] 'Financial notes: a cycle "rig"', *Edinburgh Evening News*, 20 July 1897.
[87] 'Birmingham cycle, tyre and tube market: a "corner" in tubes', *London Daily News*, 19 July 1897.
[88] 'Financial', *Cycling Magazine*, 24 July 1897.
[89] 'Birmingham cycle, tyre and tube market: a "corner" in tubes', *London Daily News*, 19 July 1897; 'Financial', *Cycling Magazine*, 24 July 1897, 21 Aug. 1897, 30 July 1898.
[90] Allen et al., 'Large investors'.

Table 3. *Cycle share returns during corners and settlements (daily return, %)*

Event	*Pre-event period: t–65, t–10*	*Event period one: t–10, t*	*Event period two: t+1, t+10*
Bagot Tyre cornered	−0.09	−0.14	0.13
Bagot Tyre settlement	−0.05	0.39	0.68
James and Tubes (America) cornered	−0.35	−0.88	−0.33
James settlement	−0.46	−0.23	−0.35
Mean	−0.24	−0.21	0.03
Tubes (America) corner cancelled	−0.16	−0.26	−0.51

Source: Author's own calculations based on the cycle share index derived from price lists in the *Birmingham Daily Mail* (1895–6), *Birmingham Daily Post* (1895–6), and *Financial Times* (1896–8).

became public knowledge. Since the corners themselves could affect the index's value, the shares that were cornered are excluded from the index for this analysis. These window lengths are chosen for consistency with Allen et al., but alternative window lengths are tested for the sake of robustness, with little effect on the results. A similar approach is used for each settlement, including the Tubes (America) cancellation, which would, if anything, be expected to spur further short-sales.

The results of this approach are presented in table 3. Returns in the pre-corner period are consistently negative, whereas those in the immediate aftermath are, on average, positive. The largest difference is in the case of the Bagot Tyre corner settlement, for which pre-event daily returns were -0.05 per cent and post-event daily returns were 0.68. The cancellation of the Tubes (America) corner, in contrast, was followed by a period of even more negative returns than before.

While these results are consistent with the hypothesis that cornering acted as a short-sale constraint, they give little idea of the significance of this effect. An alternative methodology is to perform structural break tests on the cycle share index, in order to determine whether any of the aforementioned cornering incidents substantially affected the overall trend of cycle share prices. Recent literature has frequently used this methodology in order to ascertain the significance of past events.[91] The structural break test used is that of Zivot and Andrews.[92] The major benefit of this test is that it does not require the dates of potential structural break points to be identified in advance. Instead, the proposed break point is chosen as the date at which the t-statistic for rejection of the null hypothesis is maximized. The results are therefore independent of the author's prior expectations.

To account for the possibility of more than one structural break in the data, it is necessary to perform the test multiple times, on a 'rolling window' of observations. Choosing the appropriate window length is a trade-off: too short a window length will result in the identification of spurious break points; too long a window length will result in the failure to identify genuine break points.[93] For the purposes of this article, a relatively long window length of 300 trading days is chosen, minimizing the possibility of falsely identifying structural breaks.[94]

[91] See, for example, Choudhry, 'World War II'; Brown and Burdekin, 'German debt'; Frey and Kucher, 'History'; Willard, Guinnane, and Rosen, 'Turning points'.

[92] Zivot and Andrews, 'Further evidence'.

[93] Choudhry, 'World War II'.

[94] The window length is varied as a robustness check. The structural break in Jan. 1897 is consistently identified using larger window lengths. Using significantly smaller window lengths, similar to those of Choudhry, 'World

Table 4. *Structural breaks in cycle share index, 1895–8*

Date	*Daily return (%)*	*Context*
30 March 1896	5.82	The first structural break, alternatively identified as occurring on 30 March or 15 April 1896, is associated with rapid price increases due to the acquisition of the Pneumatic Tube Company and expectation of high dividend payments at several cycle companies.
15 April 1896	3.56	
14 Jan. 1897	0.85	Bagot Tyre shares rise to a peak of £5.56, imposing heavy losses on short-sales, and preceding a period of relative buoyancy in the cycle share market.
6 July 1897	−0.49	*Financial Times* publishes an article strongly recommending the sale of cycle shares, accelerating the downward trajectory of prices.

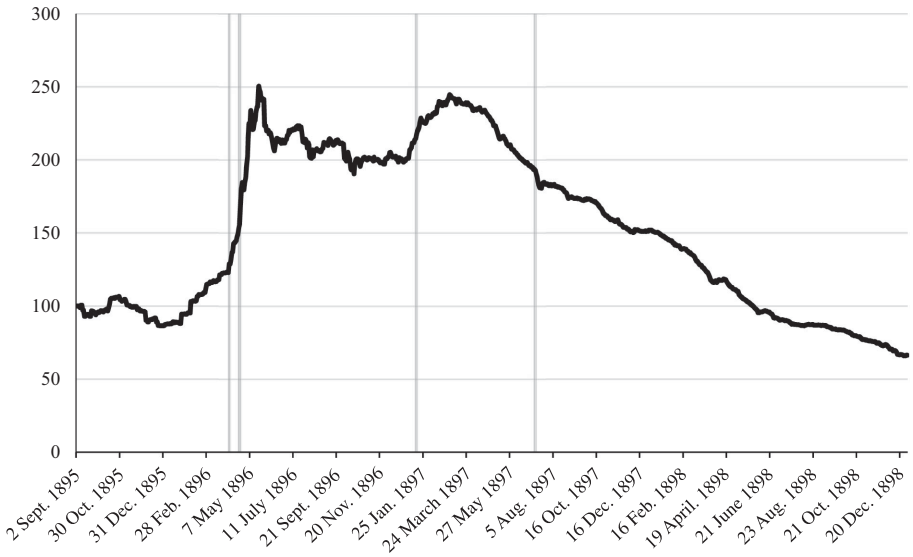

Figure 6. *Cycle share index with structural breaks, 1895–8*

Note: Structural breaks identified using Zivot–Andrews tests with a window length of 300 days; Zivot and Andrews, 'Further evidence'.

The dates of the four identified structural breaks are shown in table 4. The break of 14 January 1897 is likely to have been associated with the Bagot Tyre corner: its share price rose from £2.25 to £5.50 between 1 January and 14 January 1897, and the first short contracts were due on 16 January.[95] The other breaks are associated with the initial mania in the spring of 1896 and the publication of an article in the *Financial Times* recommending the sale of cycle shares in July 1897.[96]

As figure 6 shows, the first structural break was a change from a relatively stationary pattern in cycle shares to an upward trend. As previously noted, this

War II', produces slightly erratic results: the Jan. 1897 break point is identified when using a 20- or 30-day window, but not when using a 40- or 60-day window. This is probably the result of variation in the trend of the data when using smaller samples of returns.

[95] TNA, BT31 Board of Trade, Companies Registration Office, files of dissolved companies, Bagot Pneumatic Tyre BT31 file, 'Summary of capital and shares', 5 March 1897.

[96] 'Cycle shares & American over-production', *Financial Times*, 6 July 1897.

upward trend occurred while dividend payments were falling. This is consistent with the hypothesis that the failure of arbitrageurs to correct overpricing by short-selling securities can be partly explained by cornering risk.

A third test of the cornering risk hypothesis is a cross-sectional approach, asking whether companies that were vulnerable to corners were more overpriced than those which were not, an approach previously used by Jones and Lamont.[97] The intuition behind this test is that the price of firms that are difficult to short-sell will take longer to reflect negative changes in fundamentals, and will be overpriced in the short term. Therefore, as the price adjusts, they will experience lower medium-term returns than comparable firms.

For the reasons previously outlined, the most important risk factor for whether a firm was vulnerable to a corner or not was whether it had an Official Listing. However, since so few cycle firms were officially listed in March 1897, an Official List dummy does not vary sufficiently to include in the regressions. Therefore, two alternative factors are used as proxies for cornering risk: an establishment date within the previous three months and undersubscription.

Recently established firms were especially vulnerable to a corner because immediately after establishment the number of publicly available shares and the identity of those holding the shares were often obscured.[98] All publicly traded firms had to send a record of all shareholders to the Registrar of Companies under the Companies Act of 1862, but the first copy was only required from the company within 14 days of its first annual general meeting, which was, under the Companies Act of 1867, required to be held within four months of the company's establishment. Prior to this, shareholder records needed to be obtained from the company's registered office, and could be withheld for a 30-day period if notification was issued to a local newspaper.[99] As a result, it was generally unclear how much of a firm's nominal capital had been subscribed and called up, or how many shares were in the hands of directors. A consequence of this during the Bagot Tyre corner was that, at one stage, short-sellers had agreed to sell more shares than had been issued to the general public.[100]

A limitation of this proxy is its potential to capture an IPO underperformance effect that is unrelated to cornering risk. The tendency for new IPOs to underperform in the long term has been well documented in prior literature. However, IPO underperformance is typically observed over a much longer period than is investigated in this article, which measures returns over two-month and six-month periods.[101] Furthermore, the usual explanations for IPO underperformance are unlikely to apply to a comparison between newly issued cycle firms and existing cycle firms. For example, the entire industry might have experienced fewer major successes than was expected *ex ante*, but there is no reason to believe that this was especially true of subscriptions in the January–March 1897 period.[102] Likewise, there is no reason to believe investors were especially overoptimistic about recent cycle IPOs relative to other companies, and the methodology used is unlikely

[97] Jones and Lamont, 'Short-sale constraints'.
[98] Thring, *Law and practice*.
[99] Ibid., pp. 183, 362.
[100] 'Financial', *Cycling Magazine*, 12 Dec. 1896.
[101] Ritter and Welch, 'Review'.
[102] Ang, Gu, and Hochberg, 'IPO underperformance'.

Table 5. *Summary statistics for regression variables*

Dependent variables	*Mean*	*Std. dev.*	*Min.*	*Max.*	*Obs.*
Two-month returns	−0.171	0.143	−0.764	0.137	88
Three-month returns	−0.234	0.156	−0.750	0.036	88
Four-month returns	−0.324	0.162	−0.791	0.000	89
Five-month returns	−0.354	0.168	−0.746	0.000	88
Six-month returns	−0.358	0.178	−0.775	0.020	89
Corner vulnerability proxies					
Established in 1897	0.225	0.420	0	1	89
Unsubscribed shares dummy	0.551	0.500	0	1	89
Control variables					
Log subscribed capital	4.436	1.061	0.961	8.422	89
Discounted three-year dividend payments (%)	9.641	10.955	0	57.381	89
Bankruptcy dummy	0.337	0.475	0	1	89
Accounts made up to Oct.–March dummy	0.112	0.318	0	1	89
Pre-1900 disband dummy	0.438	0.499	0	1	89
Beta	−0.067	1.363	−4.452	4.290	89

Sources: Returns calculated from share prices published in the *Financial Times* (1896–7), and beta is calculated relative to a blue-chip index calculated using share prices published in *The Times* (1896–7). All other variables are obtained from a combination of *Stock Exchange Yearbooks* (1896–1900) and TNA, BT31 Board of Trade, Companies Registration Office, files of dissolved companies (see online app. tab. S1).

to overestimate the risk associated with newly issued firms.[103] In contrast, the mechanism by which newly issued shares could be influenced by cornering risk is very clear.

Undersubscribed firms were more vulnerable to a corner because company directors had an incentive to issue calls at a price above par in order to attract further subscription. This practice has been identified by Kleer as a cause of overpricing during the South Sea Bubble, and was the basis of Myring's successful defence against accusations of fraud relating to the Bagot Tyre corner.[104] Since this practice often resulted in a shortage of the stock, anyone who short-sold it would be especially vulnerable to a corner. The possibility of this practice occurring also produced a selection effect: undersubscription was a sign of low demand, so theoretically, undersubscribed firms are those which traders would have most liked to short-sell. The usefulness of both measures as proxy variables is emphasized by the fact that all three of the aforementioned corners occurred within three months of establishment, and all three were in undersubscribed firms.

Of the 89 cycle firms for which data are available at the share price peak of March 1897, 20 were established in the previous three months, and 49 were undersubscribed. This cross-sectional variation is exploited to test whether these firms experienced disproportionately negative subsequent returns. Subsequent returns of individual cycle firms are regressed on proxies for short-sale restrictions and controls. The dependent variables are two-, three-, four-, five-, and six-month returns in the period after March 1897. It is hypothesized that firms that were more difficult to short-sell were overpriced at this point, and would therefore experience lower future returns.

[103] Ritter, 'Long-run performance'.
[104] Kleer, 'Riding a wave'.

Table 6. *Correlations between regression variables*

	Two-month returns	*Three-month returns*	*Four-month returns*	*Five-month returns*	*Six-month returns*	*Established in 1897*	*Unsubscribed shares dummy*	*Discounted three-year dividends*	*Log subscribed capital*	*Bankruptcy*	*Accounts made up to Oct.–March*	*Pre-1900 disband*	*Beta*
Two-month returns	1												
Three-month returns	0.8272	1											
Four-month returns	0.6825	0.8231	1										
Five-month returns	0.653	0.7515	0.8996	1									
Six-month returns	0.6135	0.7123	0.8559	0.9343	1								
Established in 1897	−0.2052	−0.1453	−0.2366	−0.1791	−0.1976	1							
Unsubscribed shares dummy	−0.2073	−0.1875	−0.1638	−0.2191	−0.2164	−0.0531	1						
Discounted three-year dividends	0.198	0.1423	0.2759	0.3506	0.4079	−0.0906	0.0837	1					
Log subscribed capital	−0.1102	−0.1646	−0.1461	−0.0465	−0.0130	−0.0853	−0.1973	0.0572	1				
Bankruptcy	−0.0823	−0.1106	−0.1058	−0.1242	−0.1207	−0.1204	0.0981	−0.0058	−0.2254	1			
Accounts made up to Oct.–March	−0.0078	−0.1961	−0.0623	−0.0854	−0.1735	−0.0951	0.035	0.0285	−0.066	0.1274	1		
Pre-1900 disband	−0.0202	−0.144	−0.1679	−0.2241	−0.261	−0.1065	−0.045	−0.2818	−0.0554	0.0164	0.1186	1	
Beta	−0.0259	0.0213	0.0519	0.1769	0.1433	0.0591	−0.1364	0.0074	0.0801	0.013	−0.1768	0.0074	1

Source: Author's own calculations based on the data summarized in tab. 5.

Table 7. *Cycle share returns after March 1897*

	Two-month returns	*Three-month returns*	*Four-month returns*	*Five-month returns*	*Six-month returns*
Established in 1897	−0.085*	−0.100**	−0.120***	−0.105**	−0.107**
	(0.044)	(0.045)	(0.040)	(0.041)	(0.045)
Under-subscription	−0.078**	−0.081**	−0.081**	−0.090**	−0.101***
	(0.035)	(0.035)	(0.035)	(0.034)	(0.035)
Three-year dividends	0.003*	0.002	0.003*	0.005**	0.006***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Log subscribed capital	−0.031	−0.041*	−0.041*	−0.030	−0.025
	(0.202)	(0.021)	(0.022)	(0.021)	(0.020)
Bankruptcy	−0.039	−0.059*	−0.065*	−0.062*	−0.059
	(0.032)	(0.035)	(0.035)	(0.036)	(0.037)
Accounts paid up to Oct.–March	−0.014	−0.086	−0.026	−0.021	−0.078
	(0.050)	(0.052)	(0.054)	(0.051)	(0.052)
Pre-1900 disband	−0.001	−0.049	−0.056	−0.063*	−0.075**
	(0.033)	(0.036)	(0.034)	(0.033)	(0.036)
Beta	−0.004	0.001	0.006	0.021*	0.013
	(0.013)	(0.013)	(0.013)	(0.011)	(0.012)
Constant	0.014	0.048	−0.054	−0.140	−0.158
	(0.104)	(0.108)	(0.117)	(0.113)	(0.111)
No. of observations	88	88	89	88	89
R^2	0.126	0.183	0.224	0.270	0.296

Notes: Results of an OLS regression of cycle share returns in the period after March 1897 on auxiliary variables. Heteroscedasticity-robust standard errors are in parentheses. *, **, and *** denotes significance at the 10%, 5%, and 1% level, respectively.

The following indicators of firm performance and risk are used as control variables in the regression: three-year dividend payments, expressed as a percentage and discounted to present value; each firm's beta, calculated as the coefficient of a regression of all daily share price returns during 1897 against the returns of a blue-chip stock index; a dummy for whether the firm went bankrupt, as opposed to ceasing business due to a voluntary wind-up, reconstruction, or merger; a dummy for whether the firm disbanded prior to 1900, as a proxy for long-term performance; and a dummy for whether the firm's yearly dividend was paid outside the period for which six-month returns are calculated.

These variables are obtained from a combination of *Stock Exchange Yearbooks* and BT31 files of defunct companies, which were obtained from the National Archives. Beta is calculated using a blue-chip stock index derived from prices listed in *The Times* as a benchmark.[105] Summary statistics for each variable and correlation coefficients are shown in tables 5 and 6 respectively.

Table 7 shows the results of ordinary least squares regressions of subsequent returns on all explanatory variables. *Ceteris paribus*, recently established companies experienced two-month returns 8.5 percentage points lower on average than other cycle companies. Four-month and six-month returns were 12.0 and 10.7 percentage points lower respectively. Undersubscribed firms experienced two-month returns 7.8 percentage points lower, four-month returns 8.1 percentage points lower, and six-month returns 10.1 percentage points lower. While insufficient to fully explain the high level of share prices, this is an economically

[105] TNA, BT31 Board of Trade, Companies Registration Office, files of dissolved companies; *Stock Exchange Yearbooks* (1896–1900); *The Times* (1895–8).

significant effect: the average return on all cycle shares during these periods were −17.1 per cent, −32.4 per cent, and −35.8 per cent respectively. This suggests that, in March 1897, corner-vulnerable firms were trading at a substantial premium.

This section has presented three pieces of evidence to suggest that cornering risk helped sustain cycle share prices above fundamental values. First, the market responded to news relating to corners in a way consistent with the hypothesis that cornering risk acted as a short-sale constraint. Second, the heavy losses experienced by short-sellers in the Bagot Tyre corner coincide with a structural break in cycle share prices. Finally, during March 1897, companies that were either undersubscribed or recently established traded at a statistically significant premium. The most likely explanation for this is the increased cornering risk associated with these firms.

V

This article has argued that the risk of being cornered constituted a short-sale constraint that exacerbated and sustained an artificially high price for bicycle shares in 1896–8. Although only three corners occurred, the losses experienced were so substantial that this still represented a significant source of additional risk. High-profile cornering incidents, in which short-sellers usually made extremely heavy losses, were typically followed by periods of relative buoyancy in the cycle share market, and the most severe cornering losses are associated with a structural break in the prices of other cycle shares. Furthermore, shares that were particularly vulnerable to a corner appear to have been overpriced relative to the rest of the cycle share market.

An interesting implication of these results is that short-selling appears to have been more difficult in the unregulated Special Settlement section of the market than it was on the more tightly regulated Official List section, where corners were rare.[106] Although the Special Settlement market had almost no restrictions in place to prevent short-selling, there was also little protection against market manipulators. As a result, short-selling carried additional risk, and the market became less efficient as a result. Special Settlement stocks are known to have provided investors with relatively poor returns, suggesting that Official List regulations benefited investors.[107] The experience of the bicycle mania suggests that, perhaps more surprisingly, these regulations also allowed short-sellers to operate more freely.

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Supporting information

Additional supporting information may be found online in the Supporting Information section at the end of the article.

Table S1. Constituents of cycle firm index