Financial History Review 31.1 (2024), pp. 36–66.
doi:10.1017/S0968565024000040

Media tone and trading activity on the Sydney Stock Exchange 1901–1950

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We examine how media reports influenced trading volumes and order imbalances on the Sydney Stock Exchange (SSX) from 1901 to 1950, focusing on wool market reports as a substitute for broader financial advice in the absence of a specialised investment press. Given wool's status as Australia's primary export and its integration with various sectors, we construct a weekly media sentiment index based on news about wool sales and auctions from the *Sydney Morning Herald*. Our findings reveal that positive news about the wool market correlates with increased trading volumes and reduced order imbalances on the SSX. This relationship persisted during significant events such as the UK government's wool purchase plans, the 1929 Wall Street Crash, World War II-related trading restrictions, and the short selling ban.

Keywords: media sentiment, media tone, wool market, trading volume, Sydney Stock Exchange

JEL classification: G10, G14, N20

Thoughtful citizens realised that the Stock Exchange had become a most sensitive barometer of economic conditions, because quoted security prices reflected the general financial condition of the community, and the effects of political, industrial, climatic, and other factors on the welfare of the people as a whole.
(Were 1954, pp. 153–4, discussing the stock exchange post-1890)

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I

This article examines whether the tone of media reporting on the Australian wool market (media-based sentiment) influenced share market trading on the Sydney Stock Exchange (SSX) in the first half of the twentieth century. The wool industry played an important role in the Australian economy during this period and was the largest export commodity. Wool auction results and export earnings were widely reported in Australian newspapers and likely influenced investor thinking about the state of the economy. Prior research has shown that news on agricultural markets affects commodity market volatility expectations and market sentiment (e.g. McNew and Espinosa 1994; Cao and Robe 2022) and the wider stock market (Cao, Ionici and Robe 2024). We might expect news stories about the wool market to influence share traders' views about the health of the Australian economy. More positive news about wool clip quality and sales might provide a forward indicator that the wool season will be a financially successful season, providing higher profits for wool growers and the wool industry supply chain, and resulting positive multiplier effects across the economy.

The article contributes to a growing literature examining the impact of media sentiment on finance markets and economic activity during the nineteenth and twentieth centuries. Notable studies on the United Kingdom include Hanna, Turner and Walker (2020) on how the tone of articles impacted trading and equity returns, and Campbell, Turner and Walker (2012) on the media and share prices during the British Railway Mania. An extensive American literature includes Tetlock (2007) and Baker and Wurgler (2006, 2007) on media sentiment and equity returns, Garcia (2013) on media sentiment and recessions, Binsbergen *et al.* (2024) on sentiment and national and local GDP, consumption and employment, and Kabiri *et al.* (2022) on media sentiment and industrial production, equity returns, bank loans and the credit risk spread. Overall, these studies are consistent with Shiller's (2000) argument that the press propagates market sentiment that influences some investors more than does fundamental news (Hanna, Turner and Walker 2020, pp. 1377–8). There are fewer studies from other nations and none, we believe, on Australian stock markets in the early twentieth century.

We construct a media sentiment index by analysing the tone of articles on the wool market in Sydney's main newspaper (*The Sydney Morning Herald*) between 1901 and 1950. We develop a new series of trading activity variables using daily buy and sell bids and sales prices taken from stock and share lists. It uses optical character recognition and handwritten text recognition techniques to convert archival records from SSX with handwritten text into machine-readable data. We define trading activity in two ways: trading volume, as measured by the number of securities that had sales over the total number of tradeable securities on a given day, and order imbalance, as measured by the number of buyers and sellers posting a bid/sell price on a particular share.

The challenges for investors in interpreting news about the wool market and potential economic effects was heightened by the economic and political turbulence

https://doi.org/10.1017/S0968565024000040 Published online by Cambridge University Press

of two world wars separated by the interwar depression (Dyster and Meredith 2012, chapters 4–6). During the world wars wool sales were suspended as the United Kingdom government became the monopsony buyer of Australian wool. Studies have shown that companies and investors alter their corporate decisions and investing behaviour when there is a threat of war or during wartime (Ferguson 2008; Le Bris 2012; Verdickt 2020; Battilossi, Houpt and Verdickt 2022), although the extent of behavioural change depends on proximity to the theatre of war (Verdickt 2020). Therefore, we also examine whether the relationship between media tone about the wool market, trading volume and order imbalance is different during the two periods of monopsony buying, and during geopolitical and economic events when there were restrictions on trading volume, share price movements and short-selling and forward contracting.

Historical studies of Australian stock exchanges have focused on institutional developments (Were 1954; Hall 1968; Adamson 1984; Lougheed 1984; Salsbury and Sweeney 1988; Davis and Gallman 2001), stock market returns, price-to-earnings and payout ratios (Lamberton 1958; Brailsford, Handley and Maheswaran 2008, 2012; Mathews 2019) and the role of capital markets in mobilising finance for the resources or industrial sectors more generally (Merrett 1997; Davis and Gallman 2001; Fleming *et al.* 2004). As far as we are aware, there have been no quantitative studies on the operation of the SSX (or the Melbourne Stock Exchange) either with respect to the role of the media in informing trading activity or on the level of trading per se, although several have hinted at thin trading (Davis and Gallman 2001; Merrett and Ville 2009; Fleming *et al.* 2021).

The article is structured as follows. Section II provides background on the SSX, the type of financial news available, the importance of the wool trade, the population of shareholders, and the key geopolitical and economic events covered by our analysis. Section III outlines our data and definition of variables. Section IV reports findings on media tone, trading volume and order imbalance for the full sample period and examines whether the relationships between key variables are linear or non-linear. Section V examines media tone and trading activity during expansion and contraction years. Section VI investigates the sensitivity of our results to trading periods for the wool monopsony years and institutional restrictions such as a ban on short-selling, restricted trading windows and price restrictions. The final section provides some conclusions.

II

The SSX was established in 1871 providing capital to mining shares, although by the 1890s it had listed 'investment grade' mining companies, New South Wales government debt, and a range of industrial companies (Salsbury and Sweeney 1988). The MSX was the leading Australian exchange throughout our period under review, dominating listings and trading in Australia's largest mining, industrial and insurance companies and the banks (Adamson 1984). Both centres modelled themselves on the London Stock Exchange but were still relatively immature markets

https://doi.org/10.1017/S0968565024000040 Published online by Cambridge University Press

(especially in comparison to London and New York) with most stock traded infrequently. Davis and Gallman state, 'as late as 1914, although many small companies were able to obtain a listing on one of the exchanges, even in Melbourne and Sydney the larger part of the lists consisted of shares that were infrequently traded – that were, in the vernacular of the industry, largely inactive' (2001, p .625).

The SSX was self-regulated throughout much of our period except for World War II, when wartime controls were introduced including share price ceilings. The SSX set out trading rules on settlements, short selling and 'time bargains' (or forward contracting). It also set listing rules for new issues (prospectus with minimum information requirements), regular information (balance sheets, periodic and special reports) and requirements to inform the exchange of calls, dividends and alterations of capital. Membership increased from 68 seats (at approximately £1,000 per seat) to 100 seats in 1939 (seats selling at £5,000 per seat) (Salsbury and Sweeney 1988, pp. 241–2).

While the SSX governed trading on the exchange with a view to ensuring members provided a fair market, there were instances when it restricted certain trading strategies. Short selling and time bargains were permitted up to the 1930s, except for bans on short selling during World War I. Short selling was seen as a legitimate trading strategy on the SSX, providing an opportunity for speculators to take a position on stocks they believed were overvalued or would be negatively impacted by specific events. Similarly, SSX members could enter a time bargain on behalf of clients. However, the exchange restricted short selling and time bargains following the announcement of World War I as short sellers were 'very active selling short' and spreading 'rumours to undermine prices so that they could buy in at a profit as share plummeted' (Salsbury and Sweeney 1988, pp. 224, 291). In July 1930 the SSX Committee placed a ban on short selling 'investment stocks' although short selling was still permitted on mining stocks. This ban was to remain for the rest of the 1930s. At the outset of World War II, the SSX and MSX asked their members not to engage in 'bear trades'. Coordination between the markets ensured that members or traders could not sell in one market and buy in another to get around the ban. Generally, short selling was seen as unpatriotic and speculators profiting from the war through short selling were pilloried in the media as 'predatory operators' or 'jackals'.[1]

The SSX operated three trading sessions per day – morning (pre-noon), noon and afternoon – and traded on each weekday and a half day on Saturdays. The daily stock and share lists show variation in which securities were traded during the day. Mining shares were traded in the morning sessions whereas all listed fixed income (Commonwealth and state government stock and debentures; company debentures) and equities were traded in the noon and afternoon sessions. Given these conventions, we do not examine intraday trading in this article but focus instead on total daily

[1] See, for example, '£19,000,000 drop in ten leading companies, "bears" who are jackals', *Smith's Weekly,* Saturday 15 Jun. 1940; 'Disgrace of stock exchanges, 50,000 investors despoiled', *Smith's Weekly,* Saturday 6 Jul. 1940.

trading. Once prices were recorded in the price books the SSX would collate and publish as a monthly official record, although activity such as total volume or value of trades was not published (Salsbury and Sweeney 1988, p. 287).

The reporting of daily financial news in Australia was primarily through the Sydney and Melbourne newspapers, most notably *The Sydney Morning Herald* and *The Daily Telegraph* (Sydney) and *The Age*, *The Argus* and *The Herald* (Melbourne). The dailies provided commentary on key agricultural markets and stock markets. They also published commentary on major companies' annual meetings and short opinion pieces. There were no daily (or regular) financial newspapers such as the *Financial Times* or the *Wall Street Journal* nor regular columns in the daily newspapers. *The Australian Financial Review*, Australia's first national financial newspaper, started in 1951. End-of-day prices for the leading companies were published in both major Sydney newspapers. *The Daily Telegraph* tabulated a list of the major companies on the SSX from 1895, including closing prices. *The Sydney Morning Herald* and *The Sun* also provided daily share market information to the public.[2]

In addition to newspapers, investors could rely on stock market information from brokers or the exchanges. In Melbourne, the leading stockbroker J. B. Were pioneered the provision of client reports and investor communication with, from 1895, the *Australian Stock Exchange Intelligence* that provided reviews of balance sheets, movements in stock exchange quotations, events of interest, forthcoming equity raisings and industry analysis. Sydney investors had no equivalent until the SSX established a Research Bureau that published the *Official Gazette* in 1937. It contained stock and share lists as well as reviews of balance sheets, editorials and notes on companies (Salsbury and Sweeney 1988, pp. 285–7). These reports were made available to SSX members, their clients and smaller brokers. Investors could also draw on monthly market commentators such as Alex Jobson (*Jobson's Investment Digest*), *The Wild Cat Monthly* or *The Australasian Insurance and Banking Record* to provide analysis of financial performance, balance sheets and (increasingly) the consolidated position of holding companies. Periodicals such as *Dun's Gazette for New South Wales* (from 1909), *Smith's Weekly* (from 1919) and *Rydges Business Journal* (from 1928) provided stock market analysis and opinion articles.

The wool trade was a key sector of the Australian economy in this period, whose performance reverberated through the nation and influenced investor thinking about the state of business and the economy. Wool was Australia's largest export, particularly of high-quality merino wool used in clothing. Australia was, in turn, the world's largest producer and exporter of wool (Blau 1946, p. 184). Two important changes

[2] *The Daily Telegraph* share list reported the name of the company, total capital paid-up, reserve, the last dividend (percent per annum and date) share denomination, paid-up amount, three share prices (last sale, buyer, seller), yesterday's prices (buyer, seller) and the yield to investors (estimated on dividends for the last 12 months). *The Sydney Morning Herald* and *The Sun* share lists reported similar information – the name of the company, total capital paid-up, share denomination, paid-up amount, last dividend per annum, three share prices (last sale, buyer, seller) and the yield to investors.

at the end of the nineteenth century signalled the broader importance of wool to Australia's economy. From largely supplying the British market in the nineteenth century, shipments increasingly found their way to other parts of the globe including Continental Europe and Japan. This influenced the decision of wool brokers to shift the centre of the wool market – the auction site – from Britain to Australia (Ville 2005). This stimulated the major port cities where the auctions were conducted with the arrival of foreign buyers, brokers, insurance companies and shipowners, and the building of new infrastructure such as display warehouses and auction rooms. A major supply chain therefore connected the gate of the Australian sheep farmer via the auction sites in Sydney and Melbourne to the major textile-producing regions of the world. Moreover, some of the key players in Australia, particularly wool brokers Elders and Dalgety's, were among Australia's largest firms (Fleming *et al.* 2004, p. 49). Finally, the trade was also influential in Australian political circles, aided by the emergent Country Party, the political lobbying of well-organised industry associations, and the establishment of influential public bodies such as the Australian Wool Board (1936) and the International Wool Secretariat (1937) (Ville and Merrett 2016, p. 241).

Newspaper reports on the forthcoming wool season would typically manifest in news articles and opinion pieces in July and August each year, as the growing season was in full swing and shearing of wool had started. The first wool auction each year in Sydney would generate news reports on the quality of the clip, the number of wool buyers and early sales results. These articles would continue to the end of the first half of the season in December. The second half of the season started in mid-January and continued until May. Given the importance of the wool industry to the Australian economy, positive or negative news reports could have potentially impacted the share prices of listed companies directly involved in the sector such as wool brokers, insurers, banks, port agents and shipowners together with spillover effects to a range of sectors such as construction and building, industrial and retail.

Share ownership in Australia became increasingly democratised following World War I. In 1915 the Australian government issued the first of ten war and peace loans that introduced many Australians to investment opportunities outside bank savings accounts. In total, £250,172,440 was raised from 833,752 applicants between 1915 and 1921, with an average tenure of a loan being 9.3 years (Faulkner 1923). These loans were quoted and traded on the local stock exchanges resulting in the stock broking community servicing a larger pool of investors than prior to the war.[3] The growth in initial public offerings and seasoned equity offerings on the SSX also attracted new investors. The SSX official list increased from 356 securities in 1904/5 to 1,141 securities in 1949/50, including a larger proportion of government debt and company debentures, and 'miscellaneous' companies (Table 1).

[3] The raising of liberty bonds in the United States to finance the war effort similarly introduced the share market to a new cohort of American investors; see Hilt, Jaremski and Rahn (2022).

https://doi.org/10.1017/S0968565024000040 Published online by Cambridge University Press

Table 1. *SSX – Distribution of securities and trading by sector, 1904/5 to 1949/50*

	% Securities	% Traded	% Securities	% Traded	% Securities	% Traded	% Securities	% Traded	% Securities	% Traded
	1904/5		1915		1925		1935		1949/50	
Financials										
Govt stock & debentures	4.8%	1.6%	4.6%	2.2%	10.7%	23.6%	7.0%	12.3%	10.0%	26.9%
Banks & bank incr. stock	6.9%	9.3%	5.4%	7.7%	3.1%	5.2%	1.8%	1.8%	0.9%	3.3%
Insurance	1.7%	1.0%	1.8%	2.0%	1.1%	0.8%	0.8%	0.7%	1.1%	0.4%
Subtotal	13.4%	11.8%	11.9%	11.9%	14.8%	29.6%	9.6%	14.7%	12.1%	30.6%
Resources										
Gold	50.6%	40.2%	21.5%	4.0%	16.8%	1.4%	28.4%	33.4%	11.2%	4.2%
Silver	6.5%	28.1%	6.1%	20.4%	4.7%	9.5%	0.8%	1.5%	0.8%	2.4%
Tin & tin dredging	1.3%	0.9%	7.3%	18.1%	10.0%	12.8%	7.3%	4.7%	4.2%	1.8%
Copper	2.0%	2.4%	7.5%	12.8%	2.4%	1.9%	0.6%	0.2%	0.1%	0.4%
Coal	4.5%	1.0%	4.8%	3.2%	3.0%	2.8%	2.0%	0.5%	1.2%	0.8%
Misc. resources	0.0%	0.0%	1.7%	0.0%	2.0%	0.8%	2.7%	1.2%	1.4%	1.7%
Subtotal	64.8%	72.6%	49.0%	58.5%	38.9%	29.2%	41.8%	41.5%	18.9%	11.3%
Other										
Steam	2.7%	3.3%	2.4%	1.3%	1.6%	1.8%	1.3%	0.8%	1.2%	1.5%
Gas	3.9%	4.1%	4.3%	2.2%	2.1%	2.0%	1.8%	1.1%	1.9%	1.7%
Brewery	1.5%	2.7%	1.4%	4.2%	1.0%	3.9%	1.2%	2.5%	1.1%	1.3%
Miscellaneous	10.5%	5.4%	28.9%	21.6%	40.3%	33.2%	43.8%	39.4%	64.8%	53.7%
Land & building	3.1%	0.2%	2.2%	0.4%	1.1%	0.2%	0.6%	0.0%		
Subtotal	21.8%	15.6%	39.1%	29.6%	46.3%	41.2%	48.6%	43.8%	69.0%	58.2%
Average no. daily trades		8.7		12.1		42.3		90.5		103.7
Sample		522		723		2,539		5,429		6,222
Average listed securities	356		488		698		853		1,141	

By the late 1920s and early 1930s many of the largest listed companies had 5,000 to 10,000 shareholders, with many holding small parcels of shares.[4] Fleming *et al.* (2023) note that the number of shareholders in some of Australia's largest companies increased substantially between the 1860s and the late 1930s, The proportion of female shareholders grew rapidly to parity with males as many women became shareholders for the first time. Wheelwright (1957) found that ownership was diverse and separated from control for the top 102 public companies in the 1950s, with 75.2 per cent of shares held by individuals or households (see also Fleming, Merrett and Ville 2004, pp. 187–201). As mentioned above, the number of stockbrokers increased as the SSX grew in size and these brokers were available to service the growing number of shareholders. While we do not know exactly who bought and sold shares on a daily or weekly basis as there are no records of share transactions, the evidence above suggests it is likely that new and inexperienced investors made up an increasing proportion of shareholders. As a result, the tone of media articles on the wool market may have influenced trading volume or the number of buyers and sellers (order imbalance) more in the 1920s and 1930s than in previous decades. The growth in the number of companies on the exchange, the number of shareholders and the number of brokers may also impact traded volumes and frequency of trades.

Our focus on the relationship between media tone and trading activity covers several major geopolitical and economic events in the first half of the twentieth century. These events impacted the SSX and the newspapers of the day carried extensive coverage of domestic and overseas financial affairs. In the two world wars, the unstable political environment created uncertainty for investors about how Australia's tradeable and non-tradeable sectors would be impacted. For wool, open market auctions and private sales were suspended in November 1916 (until June 1920) with the United Kingdom government buying all Australian wool. Share trading during World War I was largely unencumbered by restrictions, leaving investors to receive and interpret themselves news of events in Europe and their impact on Australian companies. Prices for wool (by grade) were set under the wool agreement but the amount of wool for sale each year and quality meant that wool receipts could vary and have differential impacts on the economy.

A wool monopsony was also in place for World War II from September 1939 until September 1946. Wartime controls from 1942 until 1946 resulted in share trading and prices being regulated. We describe the specific trading restrictions (in particular, price ceilings and limited trading windows) in greater detail in Section V. Trading periods outside the wars were impacted by two recessions (1907–8; 1911–13) and the Great Depression (1929–32), as well as cyclical upswings in the 1920s when the growth of

[4] For example, in 1931 the Australian Gaslight Company reported 7,092 shareholders, with 4,008 holding less the £300 in shares (*Sydney Morning Herald*, 21 Aug. 1931, p. 10). In 1922, Broken Hill Proprietary reported 9,784 shareholders, with 3,091 holding between 1 and 50 shares (*Barrier Miner*, 2 Sep. 1922, p. 6).

new domestic industries and increased demand for funds resulted in an increase of IPOs and new issues (Hutchinson and Lee 2006; Ville and Merrett 2009; Fleming *et al.* 2021).

III

This section describes the data and definitions of variables used in the empirical analysis. Our data collection approach draws on and extends important recent developments in both data-driven financial history and in the digitisation methods deployed in economic and business history (Jonker and Riva 2022; Wanamaker *et al.* 2023; Amujala *et al.* 2023).

Trading volume data is taken from the handwritten SSX lists of stocks and shares detailing buy and sell bids, as well as sales prices for three trading sessions (morning, noon and afternoon) from Monday to Saturday, spanning the years 1901 (starting in January 1901) to 1950 (finishing in June 1950). Sherratt (2022) formulated algorithms to transform these handwritten notes into machine-readable text with the aid of Amazon Textract. We employed the metafiles provided by Sherratt (2022) as part of the Australian National University SSX digitisation project (Dan and Sherratt 2022).

A sample of a digital scan of the original Sydney Stock Exchange Official List of Prices record on Tuesday 1 October 1901 is included in Appendix Figure A1.[5] Several transformations were necessary on the raw data to create meaningful variables from a financial perspective. First, we removed section headings, such as 'Copper', 'Tin' and 'Gold' to avoid their being counted as a tradeable security. Second, as there are three trading sessions from the start of the sample to 13 February 1942, and then two trading sessions in the remainder, we define a tradeable security as any security traded on day t if it has non-empty *Sales* information in any of the three sessions. We use a similar definition for securities receiving a bid or an ask price on day t. To create a weekly variable, we modify the second step to define, for example, a tradeable security as one that is traded in week i if it records non-empty Sales information on any day in that week.

Daily trading volume is measured as the number of securities that had sales over the total number of tradeable securities in a given week. Order imbalance is measured as the number of securities that had a bid price over those with an offer price. For any week t, the trading volume and order imbalance are estimated as follows:

$$Trading\ Volume_t = \frac{\sum_{i=1}^{N} Security_{i,t} \times T_{i,t}}{\sum_{i=1}^{N} Security_{i,t}}$$

$$Order\ Imbalance_t = \frac{\sum_{i=1}^{N} Security_{i,t} \times B_{i,t}}{\sum_{i=1}^{N} Security_{i.t} \times S_{i,t}}$$

[5] Sourced from https://archivescollection.anu.edu.au/index.php/or59j

https://doi.org/10.1017/S0968565024000040 Published online by Cambridge University Press

Where $T_{i,t}$, $B_{i,t}$ and $S_{i,t}$ are indicator variables that return one if security i has at least one trade, one buy order, and one sell order in week t, respectively; and N is the number of unique securities available to trade in week t. The data covers all 2,898 weeks during which the SSX was open, with the SSX only closing for short periods at the outset of the two world wars.[6]

As discussed in the previous section, the SSX grew substantially over the period by number of companies (and securities) listed on the exchange. The number of securities increased due to initial public offerings (typically ordinary shares), new securities by existing companies (e.g. preference shares; rights issues), and government and corporate debt (Hutchinson and Lee 2006; Merrett and Ville 2009; Black *et al.* 2013; Fleming *et al.* 2021). Securities were also delisted due to mergers, acquisitions, voluntary delisting or removal from the official list by the SSX. Trading volume may have been impacted by the change in composition of the SSX, or it might be the case that trading was confined to a limited number of companies. If this was the case, then any relationship between media tone on the wool market and trading volume could be driven by a subset of companies influenced by news and not representative of all companies on the exchange. To assess whether those companies (and securities) that traded each day on the SSX were representative of the market, we selected five benchmark years (1904/5, 1915, 1925, 1935 and 1949/50) and recorded each unique firm that traded each day, looking at the first five trading days each month.[7] We then compared the industry distribution of securities that traded to the distribution of all securities listed on the SSX in the benchmark year. The results are presented in Table 1.

The first column for each benchmark year reports the percentage of securities by number in each industry as listed on the SSX Stock and Share List. The percentage is calculated by taking the average of the number of securities at the first and last trading day for each benchmark year, thus allowing for number of securities to increase during the year. The second column reports the average percentage of unique securities by number that traded each day, for the 60 days (12 months by first five trading days) we sampled in each benchmark year. In total, the sample comprises 15,435 observations.

The trading of financial sector securities increased in relative importance over the period and comprised 30.6 per cent of all unique trades in 1949/50 even though they made up 12.1 per cent of listed securities. Also of note is the declining importance of resources securities over the period; they were 64.8 per cent of all securities in 1904/5 (72.6 per cent of traded securities) and 18.9 per cent in 1949/50 (11.3 per cent

[6] There is one gap in the data. The daily price lists were not available for the three months October to December 1905.

[7] The benchmark years chosen included one year during World War I (1915) to see if the industry distribution of companies that traded was different during wartime than peace time. The benchmark years 1904/5 and 1949/50 cover two part-years due to data availability. Benchmark year 1904/5 comprises July to December 1904 and January to June 1905. Benchmark year 1949/50 comprises April to December 1949 and January to March 1950.

https://doi.org/10.1017/S0968565024000040 Published online by Cambridge University Press

of traded securities). Steam, gas, brewery and miscellaneous securities increased in importance from 21.8 per cent in 1904/05 to 69.0 per cent of securities in 1949/50 as companies in emerging industries (car manufacturing; electrical products; consumer services) listed. The sample of traded securities shows that these stocks were traded regularly, slightly below their proportion on the official list. Overall, we conclude that the companies (and securities) that traded each day on the SSX were relatively representative of the market, with the caveat that financial securities (in particular, government stock and debentures) increased (and resources decreased) in relative importance over time.

We build a media-based sentiment index to identify periods of positive or negative media sentiment on the wool market. Behavioural theory suggests that inexperienced or naive equity traders react to positive or negative news and therefore trading volume is related to sentiment (Garcia 2013, p. 1269; Hanna, Turner and Walker 2020). By contrast, rational well-informed traders do not react to optimistic or pessimistic media content (Tetlock 2007, pp. 1141–4). Many studies use textual analysis by counting the number of positive and negative words in newspaper articles, with words drawn from an external list such as the *Loughran–McDonald Master Dictionary* or the *Harvard IV-4* 'Harvard Psychosociological Dictionary', notwithstanding that the application of simple positive and negative word counts to financial articles can be imprecise (see Loughran and McDonald 2011, pp. 37–8). We follow this approach and count the total number of positive and negative words that were used in newspaper articles on the wool market in Sydney's leading newspaper, *The Sydney Morning Herald* (*SMH*). This is similar to Garcia (2013), who uses the fraction of positive to negative words in two columns of financial news in the *New York Times* between 1905 and 2005 (see also Tetlock 2007; Kräussl and Mirgorodskaya 2017). We chose the *SMH* because this newspaper was the oldest (and arguably most respected) daily newspaper in New South Wales (founded in 1831) and had the largest circulation during the 1930s and 1940s (Goot 1979). It reported daily on domestic and overseas finance markets, including stock market prices and a wide range of commodity prices. While specialist publications were available to investors, it is likely that the general public consumed business and financial news from daily newspapers. The penetration of daily newspapers increased between the 1933 and 1947 census, with circulation growth faster than growth of occupied dwellings or households (Goot 1979, p. 10).

The sentiment index is constructed as follows. The *SMH* has been digitised and available on TROVE, the public access digital collection of Australian newspapers maintained by the National Library of Australia.[8] News articles could be found under headings such as 'Wool Sales' or 'Sydney Wool Sales' that reported the results of auctions and a commentary by the Sydney Wool Selling Brokers Association, as well as articles on the wool industry in general or reports by leading pastoral companies. We were unable to find an appropriate finance related section

[8] See https://trove.nla.gov.au/about; accessed 28 February 2024.

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of the newspaper which would provide a regular commentary on the wool market.[9] Therefore, we used the TROVE search function to identify articles (in the headline or in the text) that contained the words 'wool', 'sales', 'prices' and 'Sydney'. We exclude articles related to 'London' as our focus is on the domestic wool market where more than 90 per cent of wool sales took place (Ville 2005). The search returned 5,999 results, of which 1,921 articles contained a headline that mentioned the wool auctions or the wool market. Most articles were on the Sydney wool market (the largest wool market) but also included articles on general market activity or other auctions or sales (Adelaide, Albury, Brisbane, Geelong, Hobart, Melbourne, Newcastle, Perth) that mentioned Sydney. We assume that the article headline would attract readers' attention and a positive or negative headline and summary of wool auctions generate positive or negative thoughts in the reader's mind and result in positive or negative sentiment.

Second, we constructed a dictionary of positive and negative words that are used in these newspaper articles. We read every article for five benchmark years (1905, 1915, 1925, 1935 and 1945) (a total of 193 articles or 10 per cent of all articles) to understand how newspapers reported wool market activity in each decade and during peace and wartime. The five benchmark years contained newspaper articles on ten wool seasons as each season ran from (approximately) August to May/June the following year. We recorded all potential positive or negative words and then cross-checked those against two established dictionaries – the *Loughran–McDonald Master Dictionary* (1993–2021) and the *Harvard IV-4 Dictionary*.[10] Based on this analysis we constructed a bespoke dictionary containing 39 words – 23 positive and 16 negative words – that we used to categorise news articles (Table 2)

Thirty-two of the 39 words in the dictionary were categorised as positive or negative by *Loughran–McDonald* (21 out of 39 words) or *Harvard IV-4* (11 out of 39 words). We also included seven words that were used to describe the nature of competition at wool markets and demand by buyers but not included in the two dictionaries above. We included these words as they were common adjectives that (at least in our sample) were always used in a positive or negative context (positive context: brisk, extreme, spirited, vigorous; negative context: downward, hesitation, slack). We then returned to the 1,921 TROVE search results and categorised each article as positive or negative by counting the number of positive or negative words. Articles with an equal number of positive and negative words were recorded as neutral, as were articles with no positive or negative words. In total, there were 984 positive articles, 193 negative articles and 744 neutral articles.

[9] There were several periodicals which provided commentary on the share market, most notably *The Bulletin*'s Wild Cat column and *Dun's Gazette for New South Wales*. We cannot determine circulation numbers for these publications so have focused on more widely available newspapers.

[10] The *Loughran–McDonald* word list was retrieved from: https://sraf.nd.edu/loughranmcdonald-master-dictionary/. The *Harvard IV-4 Dictionary* word list was retrieved from: https://inquirer.sites.fas.harvard.edu/homecat.htm

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Table 2. *Positive and negative words*

Positive words			Negative words		
L–McD	*Harvard IV*	Positive words not in either dictionary	*L–McD*	*Harvard IV*	Negative words not in either dictionary
attractive	advance	brisk	adverse	depressed	downward
excellent	bright	extreme	decline	dull	hesitation
excited	buoyant	spirited	decrease	gloom	slack
favourable	fair	vigorous	easing	unsatisfactory	
gain	keen		fall		
high	satisfactory		low		
improve	upward		poor		
improvement			uncertain		
increase			weak		
positive					
rise					
strong					

Note: L–McD = Loughran–McDonald Master Dictionary (1993–2021); *Harvard IV = Harvard IV-4 Dictionary*.

Our weekly media sentiment index, *Media*, is estimated by calculating the ratio of positive articles to the sum of positive and negative articles in any week t. It is estimated as follows:

$$Media_t = \frac{\sum_{i=1}^{N} Article_{i,t} \times P_{i,t}}{\sum_{i=1}^{N} Article_{i,t} \times N_{i,t} + \sum_{i=1}^{N} Article_{i,t} \times P_{i,t}}$$

Where $P_{i,t}$ ($N_{i,t}$) is an indicator variable that returns one if article i contains more positive (negative) words than negative (positive) ones in week t. If there are zero positive and negative articles, we overwrite *Media* as zero in that week. An increase in this ratio indicates a higher proportion of articles with a positive tone, suggesting an improvement in market sentiment as reflected by wool market auctions. To ensure the robustness of our findings, we explored two alternative measures of media sentiment: first, a ratio that includes positive, negative, and neutral articles in the denominator; second, a binary indicator that assigns a value of one when positive articles outnumber negative ones in any given week. Our empirical analysis, though not tabulated here, consistently supports our conclusions across these alternative sentiment measures. In our sample, there are 672 and 150 weeks with at least one positive and negative article, respectively; and 2,101 weeks where there are neither positive nor negative news articles on the wool market.

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Figure 1 plots the media sentiment index and the total number of articles on an annual basis. There were on average 25.8 articles each year on wool sales, 22.0 on average positive and 3.8 on average negative. The index reaches 1 (all articles were positive) in 1902, 1912, 1923, 1927 and 1947. The index also equalled 1 in 1918 and 1943, although there were few articles in those years (3 and 4 articles, respectively) when the wool monopsony was in place.

Sentiment fell below 0.5 in 1908, 1920 and 1939 (1919, 1944 and 1945 were years with zero articles). The 1907/8 wool season was particularly poor, while in 1920 there was concern over the wool stockpile following the end of UK purchases. Sentiment was also lower in 1939 at the outset of World War II on the assumption that a new wool purchase plan would be introduced. Positive sentiment was typically associated with strong wool seasons, the end of drought (end of the Federation drought in 1902) or the end of wool controls (e.g. 1946/7 wool season).

Descriptive statistics for media tone on the wool market, trading volume and order imbalance are given in Table 3. On average, *Media* is 23 per cent for the period with a standard deviation of 42 per cent.[11] Positive media tone was on average higher during the Great Depression and lower during the world wars. The weekly mean trading is 13.07 per cent of shares listed, with a standard deviation of 4.26 per cent and maximum trading of 33.49 per cent of shares listed in any week. The weekly mean ratio of buy-to-sell prices was 1.31, meaning that were was on average 31 per cent more companies with potential buyers over sellers. The median order imbalance was 1.11, with a maximum of 7.82 and a minimum of 0.66 (both during World War II). Trading volume each week was lower during the two world wars, with a mean of 9.06 per cent (World War I) and 8.78 per cent (World War II), while the maximum percentage of shares which traded was substantially lower (World War I maximum 16.26 per cent and World War II maximum 15.89 per cent). Order imbalance was significantly higher during World War II (mean 2.37) most likely due to a dearth of wartime sellers and price restrictions that prevented prices from clearing the market in situations of excess demand. The standard deviation of trading volume tended to be lower during the two world wars (1.85 and 2.77 per cent, respectively) and the Great Depression (3.7 per cent). During the two wool purchase plans, we also observe a smaller trading volume (11.92 and 8.98 per cent). Comparing the period of the second wool purchase plan with that of World War II, as the former includes one extra year of observations in 1946, the higher order imbalance in the former (2.47 vs 2.37) suggests a significant increase in purchase orders during 1946.

[11] An astute reader might find the mean statistic counterintuitive, given that we observe more positive articles than negative ones in the whole sample. The apparent contradiction arises from how we handle weeks without any articles, i.e. undefined *Media* values. Instead of counting these as neutral or positively skewed (with values of 0.5 of 1, respectively), we have chosen a more cautious approach that emphasises a positive outlook. In our analysis, a value of zero in such cases indicates a week without any positive coverage, contributing to the observed downward bias.

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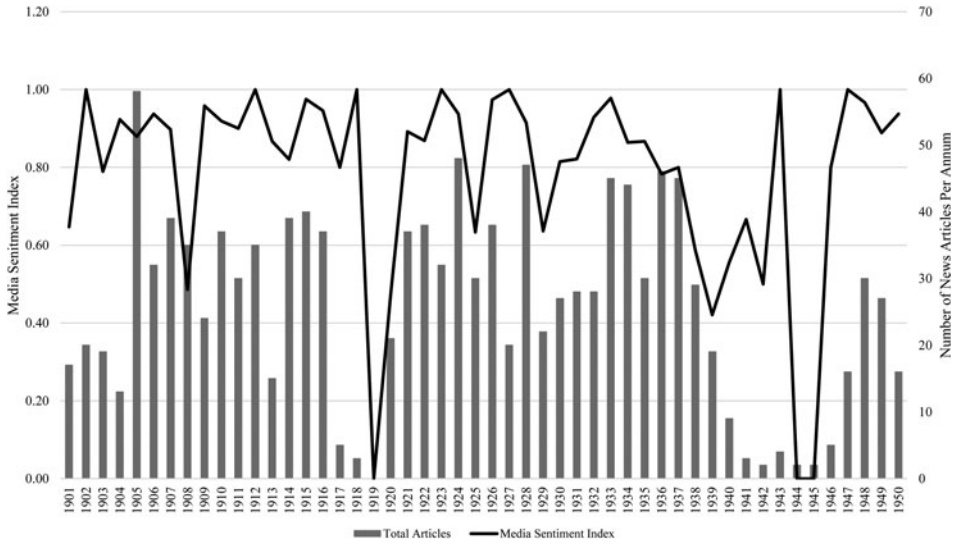

Figure 1. *Media sentiment index and number of news articles, 1901–50*
Notes: Media sentiment is measured as the ratio of positive articles over the sum of positive and negative articles. Graph shows annual data. The number of new articles per annum is the total number of positive and negative news articles on the wool industry.

Overall, the trading volume statistics show that over 85 per cent of shares listed on the SSX did not trade in any week, consistent with prior research that highlights the illiquid nature of early stock markets in Australia (Davis and Gallman 2001; Merrett and Ville 2009; Fleming *et al.* 2021).

IV

In this section, we examine the predictability of trading activity by media tone for the full sample. The ordinary least squares model is presented in equation (1).

$$Trading\ Activity_t = \beta_0 + \sum_{j=1}^{3} \beta_j Media_{t-j} + \sum_{j=1}^{3} \gamma_j Other_{t-j} + \varepsilon_t \qquad (1)$$

with *Trading Activity* measured as either *Trading Volume* or *Order Imbalance*; *Media* is measured as the ratio of positive articles over the sum of positive and negative articles per week; and *Other* is the alternate *Trading Activity* variable when either *Order Imbalance* or *Trading Volume* is used as the dependent variable.

Table 4 presents the results of model estimations where *Trading Volume* serves as the dependent variable across the entire sample. We find that media sentiment predicts trading volume up to three lags. Specifically, an uptick in positive media coverage from any of the three prior weeks correlates with increased trading volume in the present week. We also find that order imbalance from the past week is negatively

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Table 3. *Summary statistics for media sentiment, trading activity and order imbalance, by key events*

	Media sentiment					Trading activity					Order imbalance				
	Mean	Median	Max.	Min.	Std. dev.	Mean	Median	Max.	Min.	Std. dev.	Mean	Median	Max.	Min.	Std. dev.
Whole period	0.23	0.00	1.00	0.00	0.42	13.07%	12.60%	33.49%	1.94%	4.26%	1.31	1.11	7.82	0.66	0.71
World wars															
4 Aug 1914 to 11 Nov 1918	0.21	0.00	1.00	0.00	0.41	9.06%	8.99%	16.26%	3.54%	1.85%	1.12	1.13	1.49	0.73	0.13
3 Sep 1939 to 2 Sep 1945	0.04	0.00	1.00	0.00	0.20	8.78%	8.65%	15.89%	3.06%	2.77%	2.37	2.34	7.82	0.66	1.38
Great Depression															
20 Sep 1929 to 31 Dec 1931	0.25	0.00	1.00	0.00	0.43	11.90%	11.13%	20.01%	5.21%	3.70%	0.95	0.95	1.21	0.71	0.11
Wool purchase plans															
25 Nov 1916 to 29 Jun 1920	0.07	0.00	1.00	0.00	0.25	11.92%	11.06%	22.13%	6.07%	3.47%	1.16	1.16	1.54	0.83	0.11
7 Sep 1939 to 2 Sep 1946	0.03	0.00	1.00	0.00	0.18	8.98%	8.77%	16.33%	3.06%	2.78%	2.47	2.63	7.82	0.66	1.31
Wool season															
On: Aug–Dec	0.26	0.00	1.00	0.00	0.44	13.07%	12.53%	28.33%	1.94%	4.37%	1.32	1.11	7.82	0.71	0.78
Off: Jan–Jul	0.20	0.00	1.00	0.00	0.40	13.07%	12.64%	33.49%	3.43%	4.19%	1.30	1.12	6.57	0.66	0.66

Notes: Media sentiment is measured as the ratio of positive articles over the sum of positive and negative articles per week.

Table 4. *Trading volume and positive media tone*

	(1) Trading volume	(2) Trading volume	(3) Trading volume	(4) Trading volume	(5) Trading volume	(6) Trading volume	(7) Trading volume	(8) Trading volume	(9) Trading volume
Media $_{t-1}$	0.011***	0.0081***	0.0070***				0.0069***	0.0048*	0.0042*
	(0.0019)	(0.0020)	(0.0020)				(0.0019)	(0.0020)	(0.0020)
Media $_{t-2}$		0.0086***	0.0059**					0.0055**	0.0038
		(0.0020)	(0.0021)					(0.0020)	(0.0021)
Media $_{t-3}$			0.0079***						0.0051*
			(0.0021)						(0.0020)
Order imbalance $_{t-1}$				-0.020***	-0.026***	-0.026***	-0.019***	-0.025***	-0.026***
				(0.00081)	(0.0052)	(0.0052)	(0.00081)	(0.0051)	(0.0051)
Order imbalance $_{t-2}$					0.0059	0.0051		0.0064	0.0054
					(0.0051)	(0.0068)		(0.0051)	(0.0067)
Order imbalance $_{t-3}$						0.0012			0.0014
						(0.0050)			(0.0048)
Constant	0.13***	0.13***	0.13***	0.16***	0.16***	0.16***	0.15***	0.15***	0.15***
	(0.00089)	(0.00094)	(0.00097)	(0.0014)	(0.0014)	(0.0014)	(0.0015)	(0.0016)	(0.0016)
Observations	2897	2896	2895	2897	2896	2895	2897	2896	2895
Adjusted R^2	0.012	0.018	0.022	0.111	0.111	0.111	0.115	0.118	0.119

This table reports a linear predictive model for *Trading Volume*. Standard errors based on Newey and West (1987) are reported in parentheses. Significance levels are indicated by *(5%), **(1%) and ***(0.1%).

associated with an increase in trading volume. When pooling all three lags of both variables in the same model, the effects of *Media* and *Order Imbalance* from one week prior (week t-1) remain statistically significant, with p-values of 5 and 0.1 per cent, respectively.

Table 5 shifts focus to examining *Order Imbalance* as the dependent variable, revealing that media sentiment influences order imbalance across three preceding weeks. An increase in positive media tone from any of the past three weeks is associated with a reduction in order imbalance, narrowing the gap between purchase and sell orders. This 'narrowing' indicates a more balanced market whereby buying and selling pressures are relatively even and positive news about the wool market is interpreted, over several weeks, in similar fashion by buyers and sellers. Additionally, there is a negative association between *Trading Volume* and *Order Imbalance*, suggesting that an increase in trading volume may predominately stem from a rise in sell orders. This pattern aligns with periods of market uncertainty, where investors might rush to sell shares in favour of 'safer' investments such as bonds (Hudson and Urquhart 2015; Battilossi, Houpt and Verdickt 2022). When pooling all three lags of both variables, the impacts of *Media* and *Trading Volume* from the previous weeks consistently demonstrate statistical significance.

Our analysis thus far illuminates a significant relationship between positive media sentiment and trading volume; however, a nuanced interaction may extend beyond linear associations. Given the observed impact of positive media coverage on trading volume over successive weeks, we explore whether a non-linear relationship existed between these variables.[12] The effects of media sentiment on trading volume could potentially exhibit threshold effects, amplifications, or diminishing returns at different levels of sentiment intensity. In other words, the influence of market sentiment might not simply increase trading volume in a direct proportion but could vary in magnitude or direction depending on market conditions.

To investigate the non-linear effects, we introduce a squared term for the *Media* variable to assess the presence of quadratic relationships, allowing us to capture any potential non-linearity in the effect of media sentiment on our dependent variable.[13] Our model specification is presented in equation (2).

$$\begin{aligned} Trading\ Activity_t = {} & \beta_0 + \beta_1 Media_{t-1} + \beta_2 Media_{t-1}^2 + \beta_3 Other_{t-1} \\ & + \beta_3 Other_{t-1}^2 + \varepsilon_t \end{aligned} \tag{2}$$

[12] We would like to thank an anonymous reviewer for making this suggestion.

[13] We have also considered an alternative analysis of potential non-linear relationships using random forest. Results are presented in Appendix A2. The analysis is complemented by permutation-based p-values and measures of variable importance, to assess the robustness and significance of our findings. Focusing on *Trading Volume* as the dependent variable, the initial lagged values of both *Media* and *Order Imbalance* are found to possess significant predictive power. However, when the model incorporates all three lagged periods, only *Order Imbalance* retains its significance. This pattern of significance holds true as well when we pivot our analysis to consider *Order Imbalance* as the dependent variable.

https://doi.org/10.1017/S0968565024000040 Published online by Cambridge University Press

Table 5. *Order imbalance and positive media tone*

	(1) Order imbalance	(2) Order imbalance	(3) Order imbalance	(4) Order imbalance	(5) Order imbalance	(6) Order imbalance	(7) Order imbalance	(8) Order imbalance	(9) Order imbalance
Media $_{t-1}$	-0.23***	-0.16***	-0.14***				-0.16***	-0.12***	-0.10***
	(0.020)	(0.020)	(0.020)				(0.019)	(0.020)	(0.020)
Media $_{t-2}$		-0.17***	-0.12***					-0.11***	-0.086***
		(0.019)	(0.020)					(0.019)	(0.021)
Media $_{t-3}$			-0.14***						-0.096***
			(0.020)						(0.020)
Trading volume $_{t-1}$				-5.77***	-3.07***	-2.46***	-5.57***	-2.90***	-2.27***
				(0.42)	(0.55)	(0.55)	(0.41)	(0.55)	(0.55)
Trading volume $_{t-2}$					-3.07***	-1.27*		-2.96***	-1.19
					(0.55)	(0.62)		(0.55)	(0.62)
Trading volume $_{t-3}$						-2.65***			-2.58***
						(0.54)			(0.54)
Constant	1.36***	1.38***	1.40***	2.06***	2.11***	2.14***	2.07***	2.12***	2.16***
	(0.017)	(0.018)	(0.019)	(0.064)	(0.067)	(0.069)	(0.064)	(0.067)	(0.069)
Observations	2897	2896	2895	2897	2896	2895	2897	2896	2895
Adjusted R^2	0.017	0.025	0.031	0.118	0.126	0.131	0.126	0.137	0.145

This table reports a linear predictive model for *Order Imbalance*. Standard errors based on Newey and West (1987) are reported in parentheses. Significance levels are indicated by *(5%), **(1%) and ***(0.1%).

where each variable is defined as before. In Table 6, when we analyse *Trading Volume* as the dependent variable, we observe that the first lag of *Media* and its squared term ($Media^2$) do not show statistical significance. However, a different pattern emerges with the first lag of *Order Imbalance* and its squared counterpart: the former displays a significant negative relationship with weekly trading volume, while the latter shows a significant positive effect. This pattern suggests that an initial increase in *Order Imbalance* from the past week leads to a reduction in *Trading Volume*, but beyond a specific threshold, further increases in *Order Imbalance* may lead to higher *Trading Volume*.[14]

With *Order Imbalance* as the dependent variable, we find that all squared terms show significant results. Specifically, the lagged term for media sentiment is negatively associated with order imbalance, while its squared term has a positive relationship. The turning points calculated from the data may provide insights into these relationships. For media sentiment, using the figures from column 4 in Table 5, we calculate a turning point at $-(-0.87/(2\star0.65)) = 0.67$. This indicates that if the majority of news in any given week is positive, a further increase in media sentiment is linked to more purchase orders. This pattern is also observed for *Trading Volume*, suggesting that both variables follow a similar trend in their impact on order imbalance. For *Trading Volume*, the turning point calculated from column 5 in Table 5 is 0.18. This suggests a point at which the relationship between *Trading Volume* and *Order Imbalance* shifts. As more trades take place in a relatively more active market (the mean and median of *Trading Volume* is 13 and 12 per cent, respectively), a further increase in *Trading Volume* is associated with smaller reduction in order imbalance, suggesting more purchase orders may be present.

V

In this section, we examine whether media tone influences trading activity conditioned on whether trading took place during a year of expansion of real gross domestic product (GDP) or contraction of real GDP. Hanna, Turner and Walker (2020) find that media tone (positive or negative sentiment) of the financial columns in the *Financial Times* impacts trading volume and that tone impacts trading volume more in bull markets than in bear markets. One definition of bull and bear markets adopted by those authors was whether the economy was in an expansion or contraction phase. We replicate this approach by matching weekly trading activity to each year, defining an expansion year as one when the change in real GDP was positive (contraction; negative). Changes in real GDP were calculated using data from Butlin, Dixon and Lloyd (2015). There were 34 expansion years and 16 contraction

[14] Drawing on data from column 3 of Table 5, this inflection point is calculated as $-(\beta_1/2\star\beta_2) = -(-0.029/(2\star0.0017)) = 8.53$. It is important to note, however, that this finding is more theoretical than empirical, as there is only one observation with an *Order Imbalance* that was close to eight.

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Table 6. *Non-linearity analysis*

	(1) Trading volume	(2) Trading volume	(3) Trading volume	(4) Order imbalance	(5) Order imbalance	(6) Order imbalance
Media $_{t-1}$	-0.025		-0.043	-0.87***		-0.70***
	(0.034)		(0.033)	(0.12)		(0.16)
Media^2 $_{t-1}$	0.037		0.050	0.65***		0.57***
	(0.034)		(0.033)	(0.11)		(0.16)
Order imbalance $_{t-1}$		-0.029***	-0.028***			
		(0.0028)	(0.0028)			
Order imbalance^2 $_{t-1}$		0.0017***	0.0016**			
		(0.00049)	(0.00049)			
Trading volume $_{t-1}$					-25.9***	-25.5***
					(2.61)	(2.59)
Trading volume^2 $_{t-1}$					70.2***	69.4***
					(8.15)	(8.11)
Constant	0.13***	0.16***	0.16***	1.36***	3.36***	3.36***
	(0.00090)	(0.0029)	(0.0030)	(0.017)	(0.20)	(0.19)
Observations	2897	2897	2897	2897	2897	2897
Adjusted R^2	0.012	0.113	0.117	0.017	0.189	0.195

This table reports a predictive model for *Trading Volume* and *Order Imbalance*. Standard errors based on Newey and West (1987) are reported in parentheses. Significance levels are indicated by *(5%), **(1%) and ***(0.1%).

years in our 50-year period. Trading volume was higher during expansion years (average weekly trading activity 13.57 per cent) as compared with contraction years (12.03 per cent). The difference in means is significant at the 1 per cent level. Order imbalance is significantly lower during expansion years (average weekly level of 1.23) than contraction years (1.47).

Table 8 reports ordinary least squares regressions on the full sample (2,897 weeks) and subsamples using expansion (1,963 weeks) and contraction (934 weeks) years. The model specification is provided below.

$$\begin{aligned} \textit{Trading Activity}_t = {} & \beta_0 + \beta_1 \textit{Expansion}_t + \beta_2 \textit{Media}_{t-1} + \beta_3 \textit{Media}_{t-1} \\ & \times \textit{Expansion}_{t-1} + \beta_4 \textit{Other}_{t-1} + \varepsilon_t \end{aligned} \tag{3}$$

where *Expansion* is a dummy variable that returns one if a trading week falls in an expansion year.

The most notable finding in Table 7 is that media tone positively impacts trading even when controlling for expansion years. The positive and significant interaction variable suggests that during expansion years, an increase in media sentiment

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Table 7. *Trading volume, order imbalance and positive media tone – expansion versus contraction years*

	(1) Trading volume	(2) Trading volume	(3) Trading volume	(4) Trading volume	(5) Trading volume	(6) Order imbalance	(7) Order imbalance	(8) Order imbalance	(9) Order imbalance	(10) Order imbalance
Expansion years	0.011***	0.011***	0.0066***			-0.16***	-0.16***	-0.23***		
	(0.0015)	(0.0015)	(0.0017)			(0.030)	(0.030)	(0.036)		
Order imbalance $_{t-1}$	-0.019***	-0.018***	-0.019***	-0.019***	-0.018***					
	(0.00078)	(0.00079)	(0.00080)	(0.0011)	(0.0011)					
Media $_{t-1}$		0.0065***	-0.0072*	0.012***	-0.0073*		-0.15***	-0.40***	-0.067***	-0.40***
		(0.0018)	(0.0028)	(0.0023)	(0.0029)		(0.019)	(0.041)	(0.018)	(0.044)
Media $_{t-1}$ x Expansion			0.019***					0.35***		
			(0.0036)					(0.047)		
Trading volume $_{t-1}$						-5.46***	-5.29***	-5.39***	-3.97***	-9.50***
						(0.43)	(0.42)	(0.42)	(0.50)	(0.73)
Constant	0.15***	0.15***	0.15***	0.16***	0.15***	2.13***	2.14***	2.20***	1.78***	2.69***
	(0.0017)	(0.0018)	(0.0019)	(0.0020)	(0.0024)	(0.065)	(0.065)	(0.067)	(0.080)	(0.11)
Observations	2897	2897	2897	1963	934	2897	2897	2897	1963	934
Adjusted R^2	0.125	0.128	0.135	0.089	0.172	0.129	0.136	0.145	0.087	0.201

This table reports a linear predictive model for *Trading Volume* and *Order Imbalance*. Standard errors based on Newey and West (1987) are reported in parentheses. Significance levels are indicated by * (5%), **(1%) and ***(0.1%).

further increases the trading volume. Regressions on separate samples of expansion and contraction years (Table 7, columns 4 and 5) show that the coefficient for the media tone variable is 0.012 (significant at 0.1 per cent level) in the expansion years regression, versus -0.0073 (significant at 5 per cent level) in the contraction years regressions. The chi-squared test score of 27.44 further reinforces that positive media tone in expansion years is significantly different from that of contraction years.

When examining *Order Imbalance* as the dependent variable, the positive and significant interaction variable between *Media* and *Expansion* suggests that during expansion years, an increase in media sentiment is associated with a stronger buying pressure and hence a higher order imbalance. Section VI investigates the sensitivity of our results to trading periods covered by the wool monopsony years, the Great Depression, and periods with stock market trading restrictions. The final section provides some conclusions.

VI

In this section we extend our analysis to investigate the sensitivity of our results to trading periods covered by the two wool purchase plans, the Great Depression, and periods with stock market trading restrictions. It is possible that investors altered trading behaviour on the SSX during key geopolitical and economic events as news tone heightened negative emotions such as fear, gloom or anxiety or dampened their response to positive media tone (Goodell *et al.* 2022).[15]

The SSX operated throughout World War II but with varying degrees of restriction on trading (e.g. a short selling ban), price levels (a price ceiling) and trading periods. It is possible that the level of trading was less responsive to positive articles about the war during this period because the ability of share market participants to execute trades was limited by whether they could submit a buy/sell order within the trading windows, whether their order was filled and/or whether they had held shares for the minimum prescribed ownership period (five months). Alternatively, it may be the case that market participants had learned from previous wartime experience and did not trade any differently (Ferguson 2008).

Trading was suspended on Monday 4 September 1939 following the announcement of World War II (3 September 1939 in Australia) to allow members time to decide on a set of trading rules under the new geopolitical situation. The SSX committee decided to resume trading the next day (Tuesday 5 September) with bans on short selling (Salsbury and Sweeney 1988, pp. 290–305). A buoyant market for mining stocks led the SSX to remove its restriction on short selling for mining shares on 11 September 1939, but the ban remained on all other shares. However, a concerted media attack on short sellers profiting from negative news during Hitler's invasion

[15] A review of the literature on stock market anomalies and investor emotion can be found in Goodell *et al.* (2022).

https://doi.org/10.1017/S0968565024000040 Published online by Cambridge University Press

of Western Europe in 1940 resulted in a ban on all short selling (9 July 1940) for the duration of the war.

Share market trading in Australia was regulated from 1942 following the entry of Japan into the war and a reassessment by the Labour government of the role of the stock exchanges in mobilising capital for the war effort. From 11 March 1942 the SSX operated under a coordinated set of rules determined by the stock exchanges and the Treasurer Ben Chifley (of the incumbent Labour government). Listed stocks could be traded within bands of plus/minus 10 per cent of the share price on 19 February 1942. However, shares could only be traded if the owner had owned the shares for five months or longer, in an attempt to reduce speculation which might be positively impacted by the war. Price bands were reset every two weeks, so that shares could trade within the next price band. Salsbury and Sweeney (1988, pp. 300–1) note that prices traded relatively orderly for a few months after the regulations, but the strengthening local economy resulted in increased demand for stocks and share prices immediately increased to their maximum price once the SSX opened for trading. The Labour government suspended the trading restrictions following regular instances where prices would jump directly to their next maximum. Following further consultation, price maxima and minima were reset to the maximum share price prevailing in September 1941, a peak month for share prices that year (although below 1939 pre-war prices). While this system remained in place until 31 December 1946, bans on short trading and bank lending to finance underwriting of issuances remained until 1950 (Salsbury and Sweeney 1988, p. 309). In terms of trading activity, Salsbury and Sweeney stated that buyers typically outnumbered sellers throughout this period, resulting in a subdued trading volume on the SSX. J. B. Were (1954, p. 375) reported a government statement that '700 stocks were "jammed at ceiling prices"' by the end of the war.

Given the number of restrictions placed on the operation of the SSX during World War II, we formed two subperiods for analysis:

1. Short selling ban: July 1940 – February 1942.
2. Price restrictions: March 1942 – December 1946.

The ordinary least squares model is presented below in equation (4).

$$Trading\ Activity_t = \beta_0 + \beta_1 Event_{t-1} + \beta_2 Media_{t-1} + \beta_3 Other_{t-1} + \varepsilon_t \qquad (4)$$

where *Event* represents either one of the five events that are mentioned above, which are indicator variables equalling 1 if the week was during the respective period. We estimate the regression model over the whole sample, with indicator variables for each specified period.

Table 8 shows that the positive (negative) relationship between media sentiment and trading volume (order imbalance) held whether we controlled for any of the events. It is evident that the trading volume is lower in both wool purchase plans, the Great Depression, the short selling ban and the price restriction period. The drop in trading volume during short selling bans is consistent with research

https://doi.org/10.1017/S0968565024000040 Published online by Cambridge University Press

Table 8. *Media tone, wool purchase plans and restrictions on trading activity during World War II*

	(1) Trading volume	(2) Trading volume	(3) Trading volume	(4) Trading volume	(5) Trading volume	(6) Order imbalance	(7) Order imbalance	(8) Order imbalance	(9) Order imbalance	(10) Order imbalance
WWI wool purchase plan	-0.014***					-0.26***				
	(0.0026)					(0.025)				
WWII wool purchase plan		-0.037***					1.28***			
		(0.0019)					(0.061)			
Great Depression			-0.020***					-0.44***		
			(0.0033)					(0.027)		
Short selling ban				-0.043***					-0.44***	
				(0.0020)					(0.035)	
Price restrictions					-0.029***					2.08***
					(0.0046)					(0.054)
Media $_{t-1}$	0.0059**	0.0039*	0.0069***	0.0051**	0.0062**	-0.17***	-0.0042	-0.15***	-0.17***	0.011
	(0.0019)	(0.0019)	(0.0019)	(0.0019)	(0.0019)	(0.019)	(0.014)	(0.018)	(0.019)	(0.0079)
Order imbalance $_{t-1}$	-0.020***	-0.0077***	-0.020***	-0.020***	-0.0090***					
	(0.00082)	(0.00095)	(0.00083)	(0.00082)	(0.0018)					
Trading volume $_{t-1}$						-5.68***	-1.62***	-5.70***	-5.88***	-0.87***
						(0.41)	(0.23)	(0.41)	(0.42)	(0.16)
Constant	0.16***	0.15***	0.16***	0.16***	0.14***	2.11***	1.33***	2.11***	2.13***	1.22***
	(0.0016)	(0.0014)	(0.0016)	(0.0015)	(0.0023)	(0.066)	(0.032)	(0.065)	(0.068)	(0.022)
Observations	2897	2897	2897	2897	2897	2897	2897	2897	2897	2897
Adjusted R^2	0.123	0.165	0.125	0.148	0.124	0.135	0.455	0.142	0.138	0.776

This table reports a linear predictive model for *Trading Volume* and *Order Imbalance*. *WWI wool purchase plan* was implemented between 25 November 1916 and 29 June 1920. *WWII wool purchase plan* was implemented between 7 September 1939 and 2 September 1946. *Great Depression* was between 20 September 1929 and 31 December 1931. *Short selling ban* was between 9 July 1940 and 19 February 1942. *Price restrictions* were implemented between 11 March 1942 and 31 December 1946. These five variables are dummy variables that return 1 if an observation falls in the specified period. Standard errors based on Newey and West (1987) are reported in parentheses. Significance levels are indicated by *(5%), **(1%) and ***(0.1%).

that shows that removing short sellers from the stock market tends to reduce liquidity and trading volume (e.g. Beber and Pagano 2013; Fohlin, Lu and Zhou 2022).

It is worthwhile to point out that during the second wool purchase plan and price restriction period, *Media* is not significantly associated with *Order Imbalance*. The two indicator variables for these two periods are also positive and significant, in contrast to the other period. This suggests that purchase orders may play a more dominant role in these two periods. Overall, the results are consistent with research that while investors alter their trading behaviour during wartime, the extent of behavioural change depends on a country's proximity to war (Ferguson 2008; Verdickt 2020; Battilossi, Houpt and Verdickt 2022).

VII

The Australian economy was highly dependent on wool income in the first half of the twentieth century, and the weather, the prospective size of the wool clip, competition at wool auctions, wool prices and sales volume were widely anticipated and reported each year. Sydney hosted the largest auctions of the Australian wool industry, and its results were seen as a proxy for mood and sentiment about the future state of the wool industry and business conditions more generally. The tone of reporting on wool sales by Sydney's major newspaper – *The Sydney Morning Herald* – had the potential to influence share traders' views about the future health of the Australian economy, with more positive news about wool auctions providing a forward indicator that there would be higher profits for wool growers and the wool industry supply chain, and a positive multiplier effect on the economy and the government budget.

We calculated weekly trading volume and order imbalance from the SSX daily stock and share lists to assess whether they were influenced by media tone and sentiment about the wool industry. Weekly trading volume was approximately 15 per cent of all debentures and shares listed on the stock exchange, and investors had few specialist investment publications and no daily financial press from which to draw analysis and commentary. These conditions were significantly different from the large stock exchanges in London and New York where finance markets were deeper, the industry more developed, and the specialist financial press had a history of critical analysis of companies and markets. Our results show that the tone of newspaper articles on wool sales influenced share trading volume and the number of buyers in the market. There is a statistically significant relationship between positive media tone, on the one hand, and higher trading volume and lower order imbalance, on the other. The relationship is robust through major political and economic events (World War I; World War II; the Great Depression) and trading restrictions during World War II. We also find that the effects of positive articles on trading activity (volume and order imbalance) persisted during expansion and recessionary periods. Future research might pursue a different form of stratification from degree of market maturity to see whether media tone mattered equally across different industries and sectors.

Submitted: 8 September 2023
Revised version submitted: 15 April 2024
Accepted: 15 April 2024

References

ADAMSON, G. (1984). *A Century of Change: The First Hundred Years of the Stock Exchange of Melbourne*. Melbourne: Currey O'Neil Ross.

AMUJALA, S., VOSSMEYER, A. and DAS, S. R. (2023). Digitization and data frames for card index record. *Explorations in Economic History*, **87** (January), article 101469.

BAKER, M. and WURGLER, J. (2006). Investor sentiment and the cross-section of stock returns. *Journal of Finance*, **61**, pp. 1645–80.

BAKER, M. and WURGLER, J. (2007). Investor sentiment in the stock market. *Journal of Economic Perspective*, **21**, pp. 129–51.

BATTILOSSI, S., HOUPT, S. O. and VERDICKT, G. (2022). Scuttle for shelter: investor flight-to-safety and political uncertainty during the Spanish Second Republic. *European Review of Economic History*, **26**, pp. 423–47.

BEBER, A. and PAGANO, M. (2013). Short-selling bans around the world: evidence from the 2007-09 crisis. *The Journal of Finance*, **68**(1), pp. 343–81.

BINSBERGEN, J. H., BRYZGALOVA, S., MUKHOPADHYAY, M. and SHARMA, V. (2024). (Almost) 200 years of news-based economic sentiment. National Bureau of Economic Research Working Paper 32026, January 2024.

BLACK, S., KIRKWOOD, J., WILLIAMS, T. and RAI, A. (2013). A history of Australian corporate bonds. *Australian Economic History Review*, **53**, pp. 292–317.

BLAU, G. (1946). Wool in the world economy. *Journal of the Royal Statistical Society*, **109**(3), pp. 179–242.

BRAILSFORD, T. J., HANDLEY, J. C. and MAHESWARAN, K. (2008). Re-examination of the historical equity risk premium in Australia. *Accounting and Finance*, **48**, pp. 73–97.

BUTLIN, M., DIXON, R. and LLOYD, P. J. (2015). Statistical appendix: selected data series, 1800–2010. In S. Ville and G. Withers (eds.), *The Cambridge Economic History of Australia*. Melbourne: Cambridge University Press.

CAMPBELL, G., TURNER, J. D. and WALKER, C. (2012). The role of the media in a bubble. *Explorations in Economic History*, **49**, pp. 461–81.

CAO, A., IONICI, O., HECKELEI, T. and ROBE, M. (2024). USDA reports affect the stock market, too. SSRN Electronic copy available at https://ssrn.com/abstract=4391882

CAO, A. and ROBE, M. (2022). Market uncertainty and sentiment around USDA announcements. *Journal of Futures Markets*, **42**(2), pp. 250–75.

DAN, K. and SHERRATT, T. (2022). The Sydney Stock Exchange Corpus: archives digitised, visualised, available as data. Paper presented at the Asia Pacific Economic and Business History Conference 2022, 10–11 February 2022.

DAVIS, L. E. and GALLMAN, R. E. (2001). *Evolving Financial Markets and International Capital Flows: Britain, the Americas, and Australia, 1865–1914*. Cambridge: Cambridge University Press.

DYSTER, B. and MEREDITH, D. (2012). *Australia in the Global Economy: Continuity and Change*, 2nd edition. Cambridge: Cambridge University Press.

FAULKNER, C. (1923). *The Commonwealth Bank of Australia*. Sydney: John Sands.

FERGUSON, N. (2008). Earning from history? Financial markets and the approach of world wars. *Brookings Papers on Economic Activity*, Spring, pp. 431–77.

FLEMING, G., LIU, F., MERRETT, D. T. and VILLE, S. (2021). Underpricing in a developing capital market: Australian equity issuances, 1920–1939. *The Economic History Review*, **74**(3), pp. 831–55.

FLEMING, G., LIU, F., MERRETT, D. T. and VILLE, S. (2023). Gender(ed) equity: the growth of female shareholding in Australia, 1857–1937. CEH Discussion Papers 05, Centre for Economic History, Research School of Economics, Australian National University.

FLEMING, G., MERRETT, D. T. and VILLE, S. (2004). *The Big End of Town: Big Business and Corporate Leadership in Twentieth-Century Australia*. Cambridge: Cambridge University Press.
FOHLIN, C., LU, Z. and ZHOU, N. (2022). Short sale bans may improve market quality during crises: new evidence from the 2020 Covid crash. SAFE Working Paper, no. 365, Leibniz Institute for Financial Research SAFE, Frankfurt a.M., https://doi.org/10.2139/ssrn.4288587
GARCIA, D. (2013). Sentiment during recessions. *Journal of Finance*, **68**(3), pp. 1267–1300.
GOODELL, J. W., KUMAR, S., RAO, P. and VERMA, S. (2022). Emotions and stock market anomalies: a systematic review. *Journal of Behavioural and Experimental Finance*, https://doi.org/10.1016/j.jbef.2022.100722
GOOT, M. (1979). Newspaper circulation in Australia 1932-7, Media Centre Papers, La Trobe University, pp. 1–33.
HALL, A. R. (1968). *The Stock Exchange of Melbourne and the Victorian Economy 1852–1900*. Canberra: Australian National University Press.
HANNA, A. J., TURNER, J. D. and WALKER, C. B. (2020). News media and investor sentiment during bull and bear markets. *The European Journal of Finance*, **26**(14), pp. 1377–95.
HILT, E., JAREMSKI, M. and RAHN, W. (2022). When Uncle Sam introduced Main Street to Wall Street: Liberty bonds and the transformation of American finance. *Journal of Financial Economics*, **145**, pp. 194–216.
HUDSON, R. and URQUHART, A. (2015). War and stock markets: the effect of World War Two on the British stock market. *International Review of Financial Analysis*, **40**, pp. 166–77.
HUTCHINSON, D. and LEE, P. (2006). The equity market and industry development: new companies on the SSX, 1920–50. Paper presented at the Asia Pacific Economic and Business History Conference, 16–18 February 2006.
JONKER, J. and RIVA, A. (2022). Stock exchange price currents, financial information and market transparency: an introduction. *Financial History Review*, **29**(3), pp. 271–86.
KABIRI, A., JAMES, H., LANDON-LANE, J., TUCKETT, D. and NYMAN, R. (2022). The role of sentiment in the US economy: 1920 to 1934. *The Economic History Review*, DOI: 10.1111/ehr.13160
KRÄUSSL, R. and MIRGORODSKAYA, E. (2017). Media, sentiment and market performance in the long run. *The European Journal of Finance*, **23**(11), pp. 1059–82.
LAMBERTON, D. (1958). Some statistics of security prices and yields in the Sydney market, 1875–1955. *Economic Record*, August, pp. 253–9.
LE BRIS, D. (2012). Wars, inflation and stock market returns in France, 1870–1945. *Financial History Review*, **19**, pp. 337–61.
LOUGHEED, A. L. (1984). *The Brisbane Stock Exchange, 1884–1984*. Brisbane: Boolarong Press.
LOUGHRAN, T. and MCDONALD, B. (2011). When is a liability not a liability? Textual analysis, dictionaries, and 10-ks. *Journal of Finance*, **66**(1), pp. 35–65.
MATHEWS, T. (2019). A history of Australian equities. Reserve Bank of Australia Research Discussion Paper, 4, pp. 1–35.
MCNEW, K. and ESPINOSA, J. (1994). The informational content of USDA crop reports: impacts on uncertainty and expectations in grain futures markets. *Journal of Futures Markets*, **14**(4), 475–92.
MERRETT, D. T. (1997). Capital markets and capital formation in Australia, 1890–1945. *Australian Economic History Review*, **37**, pp. 181–201.
MERRETT, D. T. and VILLE, S. (2009). Financing growth: new issues by Australian firms, 1920–1939. *Business History Review*, **83**, pp. 563–89.
SALSBURY, S. and SWEENEY, K. (1988). *The Bull, the Bear and the Kangaroo: The History of the Sydney Stock Exchange*. Sydney: Allen & Unwin.
SHERRATT, T. (2022). GLAM-Workbench/anu-archives (version v1.1.2). Zenodo. https://doi.org/10.5281/zenodo.6029301
SHILLER, R. J. (2000). *Irrational Exuberance*. Princeton, NJ: Princeton University Press.
TETLOCK, P. (2007). Giving content to investor sentiment: the role of media in the stock market. *Journal of Finance*, **62**(3), pp. 1139–68.
VERDICKT, G. (2020). The effect of war risk on managerial and investor behavior: evidence from the Brussels Stock Exchange in the pre-1914 era. *Journal of Economic History*, **80**, pp. 626–69.
VILLE, S. (2005). The relocation of the international market for Australian wool. *Australian Economic History Review*, **45**(1), pp. 73–95.

VILLE, S. and MERRETT, D. (2016). Too big to save: explaining the timing and nature of intervention in the Australian wool market, 1916–1991. *Australian Journal of Politics and History*, **62** (3), pp. 337–52.
WANAMAKER, M., FRYDMAN, C. and DAHL, C. M. (2023). Preface. *Explorations in Economic History*, **87** (January), pp. 1–4.
WERE, J. B. (1954). *The House of Were 1839–1954: The History of J. B. Were & Son and its Founder, Jonathan Binns Were*. Melbourne: J. B. Were & Sons.
WHEELWRIGHT, E. L. (1957). *Ownership and Control of Australian Companies*. Sydney: Law Book Co.

Appendix

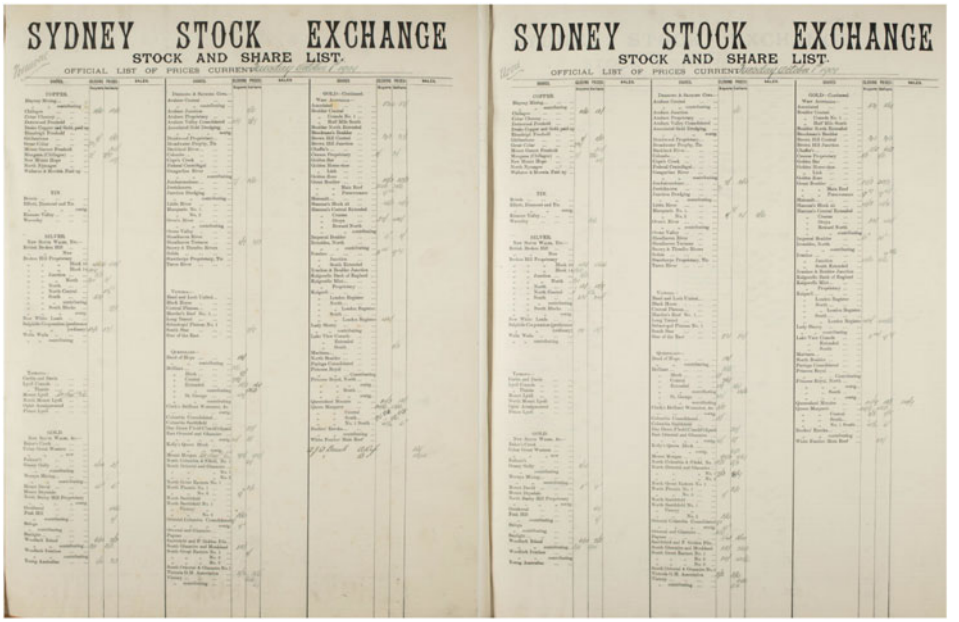
SYDNEY STOCK EXCHANGE
STOCK AND SHARE LIST.
OFFICIAL LIST OF PRICES CURRENT
SYDNEY STOCK EXCHANGE
STOCK AND SHARE LIST.
OFFICIAL LIST OF PRICES CURRENT

Figure A1. *Sydney Stock Exchange stock and share list – official list of prices on Tuesday 1 October 1901*
Source: Deposit N193 – Sydney Stock Exchange stock and share lists (https://archivescollection.anu.edu.au/index.php/or59j)

Table A1. Examples of positive, negative and neutral news articles

Positive news example
Date: 2 September 1947
Headline: Substantial Rise in Wool Prices

At the opening of the 1947–8 wool sales prices showed a substantial advance over closing rates last June. Good and better-class fleece wool and best skirtings were 25 to 30 per cent higher, while average and inferior lots ruled 20 to 25 per cent higher. Poorer quality lines showed a smaller appreciation. Best price of the day was 51½ d paid for two separate lots totalling 26 bales from the Moree district. Competition was keen. Yorkshire buyers were particularly active, with strong Continental support. A wool authority said last night that the sales might not provide any great dollar benefit in Australia because American buyers did not appear to be interested in the type of wool for sale. The main

American buyers, H Binssen, were not buying much yesterday. Queensland catalogues, however, contained considerable offerings free from vegetable fault and burr of a quality likely to be wanted by America. It was impossible to say, in view of the high prices obtained in Sydney, what sum would be involved in American purchase in Queensland but it was likely to be big enough to bring a considerable dollar benefit to Australia. Queensland sales will be held from September 15 to 18.

Negative news example
Date: 8 June 1934
Headline: Wool Sales: Sydney and Brisbane: May be Postponed
The Sydney wool sales due to begin next Monday and the Brisbane series arranged for the period, June 18 to June 28, may be postponed. The poor demand for wool at the Victorian auctions and the lack of private inquiry during the last two weeks in Sydney have been causing concern. Representatives of the growers, wool-selling brokers, and buyers met in Sydney and Brisbane yesterday to discuss the wisdom of postponing the coming sales. A decision will probably be made today. The position abroad is also giving cause for uneasiness. Trade has been disturbed by the extension of the German ban on imports, which has affected the sale of tops and yarns in France, Belgium, and England. Germany is one of the largest consumers of English and French tops and yearns, and her absence from these markets has disturbed confidence in prices. The strike of mill workers in Belgium has added to the unsettlement of European markets. Cabled advice received by some buyers in Australia indicates that few orders are likely to be available form the Continent for the coming sales. Only about 12,000 bales would be available for the Sydney market, but 90,000 bales were to be offered in Brisbane. Postponement of the sales in Brisbane, it is pointed out, would interfere with shipping arrangements already made by foreign countries. The Sydney catalogue were to be opened for inspection tomorrow morning. There has been no serious postponement of sales in Sydney since 1925. The last May series was postponed but only for a week.

Neutral news example
Date: 9 November 1934
Headline: Wools Sales: Prices Unchanged
The Sydney Wool Selling Brokers Association reports: The average price of wool in Sydney during the first three days of the week was £13 16 5 per bale and 10 5 per lb. At yesterday's auction the market closed firm, with prices unchanged from the previous day. Continental and Yorkshire buyers contracted freely, with good support from Japan. Greasy merino fleece sold to £18½ for five bales of F Melordy Yass.

https://doi.org/10.1017/S0968565024000040 Published online by Cambridge University Press

Table A2. *Non-linear predictive model using random forest*

	(2) Trading volume	(4) Trading volume	(5) Trading volume	(7) Trading volume	(4) Order imbalance	(5) Order imbalance	(6) Order imbalance	(7) Order imbalance
Media $_{t-1}$	0.00001**		0.00004**	0.00005	0.0098**		0.0254*	0.0192
	[0.0099]		[0.0198]	[0.0990]	[0.0099]		[0.0198]	[0.0594]
Media $_{t-2}$	0.000008			0.00002	0.0086**			0.0182
	[0.0594]			[0.7030]	[0.0099]			[0.1188]
Media $_{t-3}$	0.00002**			0.00002	0.0094**			0.0167
	[0.0099]			[0.5743]	[0.0099]			[0.0792]
Order imbalance $_{t-1}$		0.00059**	0.00039**	0.00063*				
		[0.0099]	[0.0099]	[0.0396]				
Order imbalance $_{t-2}$		0.00043		0.00047				
		[0.3366]		[0.3267]				
Order imbalance $_{t-3}$		0.00052*		0.0057*				
		[0.0396]		[0.0495]				
Trading volume $_{t-1}$						0.1135	0.1747**	0.1089
						[0.3663]	[0.0099]	[0.6931]
Trading volume $_{t-2}$						0.2015		0.1704
						[0.3762]		[0.6337]
Trading volume $_{t-3}$						0.1489		0.1464
						[0.3069]		[0.5050]
Observations	2,895	2,895	2,897	2,895	2,895	2,895	2,897	2,895
Adjusted R^2	0.022	0.111	0.115	0.119	0.022	0.111	0.115	0.119

This table reports variable importance permutation-based p-values for a nonlinear predictive model for trading volume and order imbalance, estimated via random forest. P-value based on the permutation approach of Altmann, Tolosi, Sander and Lengauer (2010) are reported in squared brackets. Estimation is performed via the *ranger* package in *R*. Significance levels are indicated by *(5%), **(1%) and ***(0.1%).