Chinese Influence in Australia: What Do Financial Markets Tell Us?

Kerry Liu¹

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Abstract

Australia—China relations, and especially Chinese influence in Australia, have been the subject of heated debate in Australia since 2016. The central issue is, how to balance concerns over Chinese influence in Australia with the economic benefits of Chinese trade and investment? This study—arguably the first of its kind—answers this question using rigorous empirical modelling. First, it uses Google Trends search results to measure Chinese influence in Australia. Second, it connects Chinese influence, as reflected in Google Trends search results, to financial markets, including stock markets, government bond markets and foreign exchange markets. Weekly data for January 2016–December 2019 are entered into an exponential generalised autoregressive conditional heteroskedastic model. The study finds that the effects of concerns over Chinese influence relate mainly to increased volatility of stock market indices and government bond yields, and downward pressure on the share prices of individual firms that are heavily exposed to Chinese markets. However, the overall effects appear to be minor or insignificant. The implications of these results are that China’s economic coercion (if any) may not be effective, and Australia’s responses to Chinese influence and interference (if any) may generate insignificant costs. Finally, this study makes original and significant academic contributions to academia by providing a novel framework for exploring international relations.

Keywords Australia-China relations · Chinese influence · COVID-19 · Google trends · EGARCH

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✉ Kerry Liu
Kerry.luke@gmail.com

¹ China Studies Centre, University of Sydney, Sydney, Australia

Introduction

Australia–China relations began to sour in early 2020. On 22 April, Australian Prime Minister Scott Morrison proposed an independent inquiry into the origins of COVID-19 [10], the pandemic disease that has caused huge morbidity and mortality and volatility in financial markets worldwide [30, 31]. Chinese ambassador Jingye Cheng warned that such an inquiry could spark a major reduction in Chinese students and tourists visiting Australia, as well as a boycott of agricultural exports such as beef and wine [11]. In response, the Australian Government described these comments as ‘threats of economic coercion’ [3]. Former Australian foreign minister Alexander Downer said that ‘not since the days of the Soviet Union have I seen an ambassador behave in such a reckless, undiplomatic way’ [4]. In May 2020, China slapped a tariff of around 80% on Australian barley exports for the next 5 years [5] and imposed an import ban on four Australian abattoirs [6].

Australia–China relations entered a new period in 2016, when discontent about Chinese influence and interference in Australia began to surface [36]. The catalysts were revelations about Chinese investments in Australian farmland and residential real estate and China-related political donations and propaganda [36]. At the same time, concerns were raised about the effect of this discourse on bilateral economic relations. China is Australia’s largest market for both goods and services, and as Beeson and Zeng [14] argued, China is a central topic of policy discussion in Australia. For the Australian Government, the quandary is how to retain the benefits of Chinese trade and investment while attempting to protect Australia’s interests and values from excessive Chinese influence.

This study examines this issue from a novel perspective, namely, how financial markets have responded to the debate over the balance between maintaining Australia’s national interests and security and benefiting from bilateral trade and investment with China. Compared with other markets, such as labour markets, products markets or even commodities markets, financial markets—including stock markets, government bond markets and foreign exchange markets—are highly liquid and efficient. Therefore, financial markets’ response to Australian concerns about Chinese influence should be an important indicator of the effects of a further souring of Australia–China relations.

Some authors have published general discussions of this topic, but no robust analyses exist. In this paper, measurement of Chinese influence is based on Google Trends data, analysed using an exponential generalized autoregressive conditional heteroskedastic (EGARCH) model with conditional mean and variance. Detailed descriptions of the data and model are provided below.

The structure of this paper is as follows. The ‘[Introduction](#)’ presents a brief introduction to Australia–China relations and a review of Chinese influence in Australia since 2016. ‘[Empirical Modelling](#)’ reports an empirical analysis of investor sentiment about Chinese influence in Australia, using data from Australian stock markets, government bond markets and foreign exchange markets. ‘[Concluding Remarks](#)’ concludes this paper.

Chinese Influence in Australia

Patience [41] argued that the roots of fraught Australia–China relations can be dated to the hostility directed at Chinese on the Australian goldfields in the 1850s. Similarly,

Goodman [23] asserted that the ‘China threat’ was a constant in Australian politics before there was a Commonwealth, a major cause of Federation in 1901, and a major determinant of Australia’s foreign policy thereafter. Since China began to undertake economic reform in 1978, Australia’s interactions with China have changed dramatically, with China becoming Australia’s largest trading partner in 2007. Since the 1990s, Goodman [23] argued, the Australian government established a pattern of response to China, alternating between viewing it as a threat and a friend, but without serious ruptures in relations. However, Medcalf [36] argued that the view that this round of push-back against China since 2016 will be short-lived is simplistic, and that this time may be different.

A quick review of recent developments is helpful. In 2014, a China-connected billionaire donated AU\$1.8 million (around US\$1.6 million) to help establish a think tank at the University of Technology, Sydney [45]. In 2016, this same person planned to donate AU\$0.4 million (US\$0.3 million) to the Australian labour party, seeking to influence Australia’s policy towards China’s claims in the South China Sea; after this was revealed, a high-profile labour senator with close connections to the donor resigned [47]. In August 2016, the Australian Government blocked the sale of a majority share of Ausgrid (a major electricity distribution firm in New South Wales) to a Chinese state-owned enterprise [9]. In June 2017, the Australian Broadcasting Corporation (ABC) aired a controversial but influential program *Power and Influence*, based on an investigation into Chinese infiltration of Australia [1]; as Medcalf [36] stated, it was ‘an important movement towards a new political awareness and consensus’. In November 2017, publication of a book exposing Chinese influence in Australia was delayed due to concerns over lawsuits [38]. In June 2018, the Parliament of Australia passed the *Espionage and Foreign Interference Act* [48], largely seen as being directed at limiting Chinese interference, and in August 2018, the Australian Government banned Chinese telecommunication companies Huawei and ZTE from providing 5G technology to Australia, citing concerns that ‘(they) are likely to be subject to extrajudicial directions from a foreign government’ [44]. In April 2019, China pressured a Sydney council into banning a media company critical of China [2]. In November 2019, there were claims that the Chinese Government might attempt to plant a spy in the Australian Parliament [7]. In May 2020, the Premier of the Australian state of Victoria was criticised for joining China’s Belt and Road Initiative and for allegedly being influenced by consultants with strong connections with China [46]. As Medcalf [36] concluded, in Australia, ‘awareness of China as a source of risk has become a whole-of-government attribute, crossing the spectrum from defence to development assistance to domestic policy such as communications and national infrastructure’.

Empirical Modelling

In this section, the issue of how Australia’s concern over Chinese influence might affect the economic benefits of its trade and investment relations with China is explored. The general perception is that if Australia works too hard to reduce Chinese influence in Australia, the political backlash will damage its economic relations with China. This hypothesis is examined using datasets spanning January 2016–December 2019. The next section (‘[Variables and Datasets](#)’) discusses how to measure Chinese influence in

Australia using Google Trends search results combined with other variables and datasets. Then, by employing an EGARCH model, the effects of Chinese influence concern on Australian financial markets are examined ('[EGARCH Model](#)'). Finally, following these empirical results, the fundamental determinants of the effects and their policy implications are discussed ('[Discussion](#)').

Variables and Datasets

The dependent variables are the weekly returns of Australian stock markets, including market indices and individual stocks, government bonds and the exchange rate. The performance of financial markets may be related to investors' concerns about Chinese influence and monetary policies. Chinese influence is estimated using Google Trends search results, and other data are retrieved from Wind.¹

Dependent Variables

For stock markets, the dependent variables are the weekly returns² of the Australian Securities Exchange (ASX) 200, ASX 300, ASX All Ordinaries, Fortescue Metals Group (FMG), Treasury Wine Estates (TWE) and Telstra Corporation (TLS). The ASX 200 (300, All Ordinaries) index consists of the 200 (300, 500) largest companies listed on the ASX; they are Australia's major stock market indices. FMG is an Australian iron ore company, and the world's fourth largest iron ore producer after BHP Billiton, Rio Tinto and Vale; its primary market is China. For example, during the 2017–2018 and 2018–2019 financial years, China accounted for around 90.2 and 92.9% of FMG's sales separately (FY2019 annual report. [Online] https://www.fmgil.com.au/docs/default-source/announcements/fy19-annual-report-including-appendix-4e.pdf?sfvrsn=7a1c8a9a_7. Accessed 27 August 2020). Thus, it is hypothesised that the share price of FMG is significantly associated with investors' concern over Chinese influence in Australia. TWE is Australia's largest winemaker. During the 2018–2019 financial year, Asian markets (mainly Chinese markets) contributed 41% of its earnings before interest and tax, and the Chinese market is expected to grow 9.8% during 2018–2022, in contrast with just 1.2% in Canada, 0.7% in New Zealand and negative growth in the United States (USA), Japan, Australia and the United Kingdom (UK) (Source: FY2019 annual report. [Online] <https://www.tweglobal.com/-/media/Files/Global/Annual-Reports/2019-Annual-Report.ashx>. Accessed 27 August 2020). It is evident that the Chinese market is very important to TWE. Thus, it is hypothesised that the share price of TWE is significantly associated with investors' concern about Chinese influence in Australia. TLS is an Australian telecommunications company. During the 2018–2019 financial year, its overseas revenue accounted for only 5.8% of total revenue.³ Its mobile service, which is its largest business segment, has 18.3 million retail customers; its Chinese tourist customers are assumed to be

¹ Wind (<https://www.wind.com.cn/en/>) is an economic and financial data and information provider.

² The reason why weekly rather than daily data is used is because the primary variable measuring Chinese influence in Australia is weekly. Detailed discussion is provided in '[Government Bond Markets](#)' of this subsection.

³ TLS' overseas revenue for FY2019 was AU\$1471 million vs. total revenue of AU\$25,259 million. See <https://www.telstra.com.au/content/dam/tcom/about-us/investors/pdf%20F/2019-Annual-Report-singlepages.PDF>. Accessed 27 August 2020.

negligible in number.⁴ In overall, the Chinese contribution to TLS is assumed to be marginal; thus, it is hypothesised that the relation between its stock return and the Chinese influence indicator is insignificant.

Australian 2-, 5- and 10-year government bonds are chosen to represent the Australian bond market. The basic idea is to see whether investors' concerns over Chinese influence in Australia can significantly affect government bond yield, thus signalling reduced economic growth. For example, Plosser and Rouwenhorst [42] found that for the USA, Germany and the UK, the long end of the term structure contains information about the future growth of industrial production beyond expectations about future monetary policy. Harvey [25] found that yield curve measures explain more than 30% of the variation in US economic growth during 1953–1989. For Australia, Alles [8] found that around one-third of the variance in 2-year gross domestic product (GDP) growth can be explained by the term structure one to two quarters ahead.

For foreign exchange markets, the AUD–USD exchange rate is chosen. While it is true that exchange rate fluctuations are very difficult to predict using economic models (random walk forecasts may perform better [43]), exchange rates incorporate information about future fundamentals [19].

The summary statistics of these dependent variables (weekly returns, all stationary, based on the augmented Dickey–Fuller test) are presented in Table 1. Except for the weekly return data from the AUD–USD exchange rate, the kurtosis values are greater than the standard normal distribution value (+ 3), indicating that the distribution has 'sharp peak' and 'fat tail' characteristics. Accordingly, the null hypothesis that the return series is normally distributed is rejected, and Student's *t* distribution is used. These findings are used in the EGARCH modelling conducted in 'EGARCH Model'.

Independent Variable—Chinese Influence

In this study, Google Trends search results are used to measure Chinese influence in Australia. Google Trends is a Google website that analyses the popularity of queries in Google Search across various regions and languages. It is anonymised (no one is personally identified), categorised (by topic) and aggregated. Real-time data cover the last 7 days; other search trends are measured weekly or monthly. While only samples of Google searches are used in Google Trends, this is sufficient, because Google handles very large numbers of searches per day. Also, Google Trends search results are normalised to the time and location of a query by the following process. Each number of searches per topic is divided by the total number of searches in the geographical area and time range it represents; the resulting numbers are then scaled on a range of 0 to 100 based on a topic's proportion of all searches on all topics. Hence, regions with the same level of search interest for a term do not always have the same total search volumes. By normalising data, comparing searches across dates, countries or cities becomes possible. In short, the numbers represent search interest relative to the highest point on the chart for the given region and time. A value of 100 is peak popularity for the term; a value of 50 means that the term is half as popular; a score of 0 means there was not enough data for this term.

⁴ In 2019, 1.44 million Chinese tourists visited Australia (Sources: Wind, Australian Bureau of Statistics).

Table 1 Summary statistics of dependent variables (weekly return) of stock market indices, individual stocks, government bonds and Australian dollar exchange rate against the US dollar: 8 January 2016–13 December 2019

	ASX200	ASX300	ASXALL	Fortescue Metals	Treasury Wine	Telstra	2-year Gov Bond	5-year Gov Bond	10-year Gov Bond	AUD USD
Mean	0.13	0.13	0.14	1.12	0.38	-0.17	-0.01	-0.01	-0.01	-0.0001
Median	0.23	0.23	0.25	0.00	0.09	0.00	-0.01	-0.02	-0.02	-0.0005
Maximum	4.45	4.38	4.17	23.88	19.74	8.45	0.19	0.25	0.31	0.03
Minimum	-5.76	-5.68	-5.52	-11.01	-11.50	-10.94	-0.28	-0.26	-0.23	-0.03
Std. Dev.	1.57	1.56	1.52	5.94	3.91	2.96	0.06	0.08	0.09	0.01
Skewness	-0.42	-0.43	-0.48	0.98	0.54	-0.24	-0.27	0.25	0.57	0.04
Kurtosis	4.51	4.55	4.64	4.82	6.01	4.27	4.80	3.40	3.30	2.79
Jarque-Bera	24.91	26.41	30.27	60.24	85.58	15.40	29.28	3.31	11.34	0.44
Obs	201	201	201	201	201	201	198	198	198	198

Other studies using Google Trends queries have appeared in various fields. For example, in the field of epidemiology, Ginsberg et al. [22] found that using Google Trends search queries can help detect influenza epidemics in areas with a large population of web search users. In economics, Choi and Varian [17] showed that Google Trends search data can forecast near-term values of economic indicators such as automobile sales, unemployment claims, travel destination planning and consumer confidence. In finance, Google Trends data have been widely used to examine asset pricing. For example, Kristoufek [28] found that Google Trends search queries and BitCoin prices are correlated. Challet and Ayed [16] wrote that Google Trends data are aggregate signals generated by many individuals and are related to the underlying assets and further concluded that Google Trends data are equivalent to price returns. Based on datasets from 40 countries for 2004–2014, Gao, Ren and Zhang [20] found that a sentiment measure using Google Trend data is significantly associated with country-level stock market returns. Yu, Zhao, Tang and Yang [50] reported that Google trends data can significantly associated with oil consumption. Liu [31] used Google Trends data to measure the uncertainty resulting from COVID-19 and found that it was significantly associated with movements in Chinese stock markets. Finally, Liu [32] used Google Trends data to measure the uncertainty resulting from the USA–China trade war during 2018–2019, and concluded that uncertainty significantly affected Chinese currency and stock markets.

While it may be true that Google Trends search queries are not an expressive act, as answering survey responses are [37], they do reflect investor sentiment. In the context of Chinese influence in Australia, a bigger Google Trends value indicates a more uncertain impact on the Australian financial markets. A positive difference in Google Trends data means a higher uncertainty about the effects, thus causing a negative shock to financial markets.

Google Trends search queries originating from Australia are used. The key phrase ‘Chinese influence’ generates the most results; other phrases such as ‘China influence’, ‘Chinese investment’, ‘China threat’, ‘Chinese interference’ generate many fewer results. Therefore, only data generated using Chinese influence is used. Figure 1 shows the search results based on Google Trends.

Figure 1 shows that the Chinese influence index reached its peak level in the week ending 9 June 2017, when the ABC released *Power and Influence* (based on its investigation of China’s influence in Australia). A second peak occurred in March 2018, shortly after a high-profile Labour senator resigned, when the Australia Government announced plans to ban foreign donations to Australian political parties and activist groups, and after *Silent Invasion: How China Is Turning Australia into a Puppet State* was published in late February 2018.⁵

Independent Variable—Monetary Policy

As Ioannidis and Kontonikas [26] argued, a change in monetary policy can affect stock returns in several ways. First, there is a direct effect on stock returns by altering the discount rate used by market participants. Easing monetary policy leads to a drop in the

⁵ This book was the No. 1 seller in the category of international relations on Amazon. See <https://www.amazon.com.au/Silent-Invasion-Clive-Hamilton-ebook/dp/B079WWT29L>. Accessed 27 August 2020.

Fig. 1 Keyword search results using ‘Chinese Influence’ based on Google Trends during January 2016–December 2019. *Source: Google Trends*

rate at which firms’ future cash flows are capitalized, causing stock prices to increase. Second, a change of monetary policy exerts an indirect effect on the firms’ stock value by altering expected future cash flows. Monetary policy easing is expected to increase the overall level of economic activity, creating higher cash flows in the future, and the stock price responds positively. This means that the effects of monetary policy on asset returns may include more than one period; that is, the discount rate channel may be followed by an expected cash flow channel. The same logic applies to bond returns. Furthermore, according to the interest rate parity theory, monetary policy plays an important role in determining exchange rates. Empirical evidence also shows that the interest rate differential is a major factor influence on the Australian dollar exchange rate [15].

As noted earlier, this study uses weekly data, so the sensitivity of monetary policy variables may be less than that based on daily data. Results are presented in ‘[EGARCH Model](#)’.

EGARCH Model

In this section, a series of EGARCH models is employed to examine the effects on financial markets, including stock markets, government bond markets and foreign exchange markets, of the Australian public’s concern about Chinese influence. As Kim [27] argued, the GARCH family of models is well suited to model financial returns series, which are characterised as skewed, leptokurtic and non-normal distributions with time-varying and clustering. Kim [27] used the EGARCH (1, 1) model to examine the returns of Australian stock markets, government bond markets and the Australian dollar against the US dollar, and concluded that a parsimonious specification often outperforms more profligate ones. While Kim [27] included two lags of the dependent variable to allay concerns about residual serial correlations, this was not an

issue for this study, so no lags of dependent variables are included (see residual tests at Appendix 1). Also, while Kim [27] considered the Monday and holiday effects for daily return data, this study does not include these factors due to its use of weekly return data. As discussed in ‘Variables and Datasets’ ‘Independent Variable: Monetary policy’, two periods (lag 0 and lag 1) of the interest rates variable are used. This choice is confirmed by the smallest Akaike info criterion. For the Chinese influence index, the level variable is used in the mean equations, and the change (first difference) variable is used in the variance equations. It makes more sense to examine change in the Chinese influence index in response to financial market volatility. Because it usually takes some time for the market to respond to any news on Chinese influence, lag order 1 is chosen; this choice is also consistent with the smallest Akaike info criterion.

Stock Markets

Tables 2 and 3 show regression results for market indices and individual stocks.

Table 2 shows that, for mean equations, the coefficients of Chinese_Infln are negative but insignificant within a 10% confidence level for ASX 200, ASX 300 and ASX All Ords. This means that the Australian public’s concern over Chinese influence in Australia translates into a negative shock to Australian firms, including all large, medium and small-capitalization firms, but the overall effect is insignificant. Any public concern and debate about Chinese influence in Australia may undoubtedly affect

Table 2 Estimated EGARCH parameters: stock markets (market indices)

Variable	ASX 200	ASX 300	ASX All Ords
Mean equation			
C	−0.0739	−0.033	0.052
D_Cash_Rate	2.395	2.361	2.033
D_Cash_Rate (−1)	−2.383	−2.391	−2.618
Chinese_Infln (−1)	−0.007	−0.007	−0.007
Variance equation			
C	0.113*	0.105	0.101
ARCH effect (−1)	0.045	0.064	0.045
Asymmetric effect (−1)	−0.253***	−0.259***	−0.280***
GARCH effect (−1)	0.747***	0.732***	0.735***
D_Cash_Rate	−3.912	−3.905	−3.917
D_Cash_Rate (−1)	3.020	3.036	3.251
D_Chinese_Infln (−1)	0.010*	0.011**	0.011*

Dependent variable: weekly return of ASX 200, ASX 300 and ASX All Ordinaries. Method: ML ARCH—Student’s *t* distribution (BFGS/Marquardt steps). Convergence is achieved for all models. Sample (adjusted), 18 January 2016–25 November 2019. Included observations, 197 after adjustments

D_Cash_Rate, the first difference of cash rate (Australia’s official policy rate, defined as the interest rate on unsecured overnight loans between banks); *Chinese_Infln*, the Chinese influence in Australia index based on Google Trends search results; *D_Chinese_Infln*, the first difference of Chinese_Infln

***1%, **5% and *10%—levels of significance

Table 3 Estimated EGARCH parameters: stock markets (individual stocks)

Variable	TWE	FMG	TLS
Mean equation			
C	2.048***	−9.417**	2.870
D_Cash_Rate	0.104	10.670	−3.194
D_Cash_Rate (−1)	2.851	−7.189	−9.963
Chinese_Infln (−1)	−0.003**	−0.030	−0.009
Variance equation			
C	−1.635***	0.189***	2.102**
ARCH effect (−1)	−0.095	−0.136***	−0.053
Asymmetric effect (−1)	0.040	−0.027	0.208
GARCH effect (−1)	0.240	0.971***	0.053
D_Cash_Rate	−0.961	5.283**	−1.111
D_Cash_Rate (−1)	12.273***	−5.458**	−0.959
D_Chinese_Infln (−1)	−0.002	0.001	0.004

Dependent variable: weekly return of Treasury Wine Estate (TWE), Fortescue Metals Group (FMG) and Telstra Corporation (TLS). For TWE and TLS, the method is ML ARCH—Student's *t* distribution (BFGS/Marquardt steps); for FMG, the method is ML ARCH—Student's *t* distribution (Marquardt/EViews legacy). Convergence has been achieved for all models. Sample (adjusted), 18 January 2016–25 November 2019. Included observations, 197 after adjustments

D_Cash_Rate, the first difference of cash rate (Australia's official policy rate, defined as the interest rate on unsecured overnight loans between banks); *Chinese_Infln*, the Chinese influence in Australia index based on Google Trends search results; *D_Chinese_Infln*, the first difference of *Chinese_Infln*

***1%, **5% and *10%—levels of significance

bilateral political relations, and may be followed by economic coercion from China, and cause Australian firms to lose market share in China. However, the results presented here suggest that stock markets believe that the loss of market share in China, if any, is insignificant. At the same time, for the variance equation, the coefficients of *D_Chinese_Infln* are always positive and significant within a 10% confidence level for all market indices. This shows that although Chinese influence concerns may not necessarily cause a significant drop in the whole stock market, an escalation of concern about Chinese influence (a positive difference in the Chinese influence index) can increase the volatility of stock markets.

Table 3 further shows that these effects depend on the level and nature of individual firms' exposure to Chinese markets. For example, for TWE, which concentrates on Chinese markets (see the discussion in 'Dependent Variables'), the Australian public's concern over Chinese influence can cause a significant drop in its share price. For FMG, which also concentrates on Chinese markets, the impact on share price is insignificant. This difference may be related to the disparate nature of their businesses (i.e. iron ore for FMG vs. wine for TWE; see further discussion in 'Discussion'). For firms such as TLS, whose exposure to the Chinese markets is small or even negligible, the effect is insignificant.

Interest rates are an insignificant factor; the frequency of data (weekly data) used in this analysis probably means that the effects of interest rates are less easy to detect.

Similar results are drawn from bond markets and exchange rate regressions (see ‘Government Bond Markets’ and ‘Australian Dollar Exchange Rate’ of this section).

The residuals from model equations behave well. Residual tests (see Appendix 1) reveal no signs of volatility clustering in the standardised residuals. There are also no signs of persistence in either the standardised residuals or squared standardised residuals, indicating no residual autocorrelations or ARCH effects.

Government Bond Markets

Table 4 shows the regression results for Australian government bonds.

Table 4 shows that for mean equations, the coefficients of *Chinese_Infln* for 2-, 5- and 10-year Australian Government bonds are all positive but insignificant at a 10% confidence level. It means that when the Australian public is concerned about Chinese influence, the government bond yield will increase, indicating that investors are selling bonds. As discussed in part A of this section, concern about Chinese influence can cause an (insignificant) drop in stock markets. This uncertainty resulting from concern about Chinese influence causes investors to sell not only stocks but government bonds (and probably increase cash holdings). However, these effects are all insignificant.

For variance equations, the results are consistent, that is, an escalation of concern about Chinese influence (a positive difference in the Chinese influence index) can

Table 4 Estimated EGARCH parameters: government bond markets

Variable	2-year Gov Bond	5-year Gov Bond	10-year Gov Bond
Mean equation			
C	− 0.169***	7.915	− 0.598
D_Cash_Rate	0.344	1.623	0.257
D_Cash_Rate (− 1)	− 0.130	− 0.477	− 0.325
Chinese_Infln (− 1)	0.0003	0.0006	0.002
Variance equation			
C	− 3.747***	− 4.850*	− 0.560
ARCH effect (− 1)	0.597***	− 0.001	0.009
Asymmetric effect (− 1)	0.042	0.003	− 0.009
GARCH effect (− 1)	0.433***	0.070	0.887***
D_Cash_Rate	− 2.715	− 0.858	0.058
D_Cash_Rate (− 1)	1.843	0.313	− 0.512
D_Chinese_Infln(− 1)	0.019***	− 0.0003	0.015**

Dependent variable: weekly interest rates changes of 2-year government bond, 5-year government bond and 10-year government bond. Method: ML ARCH—Student’s *t* distribution (Marquardt/EViews legacy). Convergence has been achieved for all models. Sample (adjusted), 18 January 2016–25 November 2019. Included observations, 197 after adjustments

D_Cash_Rate, the first difference of cash rate (Australia’s official policy rate, defined as the interest rate on unsecured overnight loans between banks); *Chinese_Infln*, the Chinese influence in Australia index based on Google Trends search results; *D_Chinese_Infln*, the first difference of *Chinese_Infln*

***1%, **5% and *10%—levels of significance

significantly increase the volatility of 2-year and 10-year government bonds, but not affect 5-year government bonds significantly.

Australian Dollar Exchange Rate

In this part, two new variables are introduced. The first is the interest rate differential (IRD) between the Australian cash rate and the US federal funds rate. The second is the US dollar index, which is a weighted geometric mean of the dollar's value relative to six currencies (the euro, Japanese yen, pound sterling, Canadian dollar, Swedish krona and Swiss franc). Table 5 presents the regression results.

Table 5 shows that for both the mean equation and the variance equation, the coefficients of the Chinese influence index are insignificant at a 10% confidence level. It means that the Australian public's concern about Chinese influence cannot exert any significant effects on the Australian dollar exchange rate, no matter what its mean value or volatility. Because concerns over Chinese influence are assumed to harm the fundamentals of the Australian economy, this result can be interpreted as meaning that this harm (if any) will not be significant enough to affect the exchange rate.

To summarize, in this section, a series of EGARCH models are used to examine the impacts of concern about Chinese influence on Australian financial markets. Generally speaking, these effects are mainly about increasing the volatility of stock market indices and government bond yields. Depending on the nature of the business, the share prices of

Table 5 Estimated EGARCH parameters: Australian dollar exchange rate

Mean equation	
C	−0.621***
D_IRD	−0.133
D_IRD (−1)	−0.0003
D_USD_Index	−1.726**
Chinese_Infln (−1)	−6.4E−05
Variance equation	
C	−11.902***
ARCH effect (−1)	−0.017
Asymmetric effect (−1)	0.005
GARCH effect (−1)	−0.326*
D_IRD	−1.854
D_IRD (−1)	−0.765
D_USD_Index	−26.403***
D_Chinese_Infln (−1)	0.0001

Dependent variable: weekly return of Australian dollar exchange rate against the US dollar (a positive value means appreciation of Australian dollar). Method: ML ARCH—normal distribution (BFGS/Marquardt steps). Sample (adjusted): 18 January 2016–18 November 2019. Included observations, 196 after adjustments

D_IRD, the first difference of interest rate differential between Australian cash rate and Federal funds rate; *D_USDI*, the first difference of US dollar index; *Chinese_Infln*, the Chinese influence in Australia index based on Google Trends search results; *D_Chinese_Infln*, the first difference of *Chinese_Infln*

***1%, **5% and *10%—levels of significance

individual firms which are heavily reliant on Chinese markets may fall. The overall effects are likely to be insignificant, as evidenced by the Australian dollar exchange rate.

Discussion

There are several possible reasons for the minimal response of Australian financial markets to negative shocks caused by concern over Chinese influence on the Australian economy.

First, Australia's economic reliance on the Chinese market is not as great as generally perceived. In terms of trade, China is Australia's largest export market for both goods and services. Figure 2 shows that in 2018, China accounted for 34.3% of Australian goods exports, and 19.3% of services exports; in total, China accounted for 31.4% of Australian exports. At the same time, during 2000–2019, goods and services exports accounted for around 20% of Australian GDP (23.1% in 2018).⁶ Thus, the Chinese market contributed 7.2% of Australian GDP in 2018. The reality is that the Australian economy is mainly driven by domestic consumption. For example, during 2000–2019, domestic consumption's share of Australian GDP ranged from 72.2 to 76.5%.⁷

Even it is true that Australia's trade concentrates heavily on China, this relationship may be more about mutual benefit than single-sided benefit. For example, the market for iron ore,⁸ Australia's largest category of export to China, is a supply market rather than a demand market. As a UBS analyst stated, 'the market is very tight, everyone is running as hard as they can ... you couldn't find a spare tonne elsewhere in the market' [12]. The share of Australian iron ore among China's iron ore imports steadily increased from 30.0% in 2007 to 63.9% in 2018, followed by Brazilian iron ore with around 20% of market share.⁹ It will be difficult for China to find alternative sources. Furthermore, Australian iron ore is competitive in global markets as a result of high quality, low price and low shipping costs [24]. These may be the reasons why concerns about Chinese influence have an insignificant impact on FMG's share price.

While a recent fall in China's imports of thermal coal was driven by government policy, and China represents the biggest risk to the outlook for metallurgical coal prices due to the sheer size of its domestic coal market and ongoing uncertainty over its import policy [18], the overall effects on the Australian economy may be minor. Giesecke, Waschik and Tran [21] modelled the scenario that China would cut its Australian coal imports by 25% and found that Australia's national consumption would be just 0.04% lower. Similarly, because most deliveries of Australia's liquefied natural gas (LNG) to China have very limited flexibility to reduce volumes due to long-term contracts [13], there is little scope for China to reduce its imports of Australian LNG in the short term.

⁶ Source: Wind, ABS

⁷ Source: Wind, ABS

⁸ In 2019, iron ore was Australia's largest export to China, earning AU\$79.5 billion (US\$55.4 billion), followed by natural gas and coal, which earned AU\$30 billion in total (equivalent to US\$20.9 billion). Beef is Australia's fifth largest export (excluding confidential items of trade) to China, earning AU\$2.67 billion in 2019 (US\$1.86 billion). Alcoholic beverage exports to China in 2019 earned AU\$1.24 billion (US\$0.86 billion). Source: ABS

⁹ Source: Wind, General Administration of Customs

Fig. 2 China's share of Australia's exports, 1987–2018. *Source: ABS (Australian Bureau of Statistics), Department of Foreign Affairs and Trade*

In terms of investment, Chinese investments in Australia are relatively small. Based on Australian Bureau of Statistics (ABS) data, as of 2018, China only accounted for 4.1% of total direct investment in Australia, and just 1.8% of total foreign investment (including both direct and portfolio investment). Meanwhile, the USA accounted for 22.1 and 26.7% respectively.¹⁰ Although, Chinese investments in Australia have attracted much attention from the media and the public,¹¹ Chinese investment in Australia is smaller than is publicly perceived, and still far behind the level of investments from the US.

Secondly, and most importantly of all, although Chinese consumption is playing a more and more important role in its economy [33], the Chinese economy is still essentially corporate-centric [34]. One recent piece of evidence is its response to the economic shock of COVID-19. While major economies used cash handouts as part of fiscal stimulus, the Chinese authorities relied more on pushing state-owned banks to increase lending and less on giving money directly to its people [39]. This means that when political relations between Australia and China are tense, Chinese authorities may be more likely to use consumer goods and services than producer goods and services as economic leverage. However, Australia's agrifood exports to China are not as big as its resource exports, and any bans from China are more likely to be partial than full-scale. Similarly, education is the dominant purpose of Chinese tourists visiting Australia. As

¹⁰ Liu [29] asserted that ABS data may underestimate the real value of Chinese investments in Australia, because they measure direct rather than ultimate ownership of foreign investments. Another dataset designed and maintained by the Australian National University (ANU) tracks the ultimate ownership of foreign investments in Australia, and shows that the real value of Chinese investment is higher than the ABS data suggests. As the ANU data only cover Chinese investments, it is difficult to make comparisons.

¹¹ According to a Lowy Institute [35] poll, 72% of Australians said the Australian government is allowing too much investment from China in 2018, while this figure was just 56% in 2014.

China–US relations (and China–Canada and China–UK relations) deteriorate,¹² Chinese students' choices for overseas study narrow substantially. Thus, the negative shock to education income, if any, may be insignificant.

In summary, the small response of Australian financial markets to concerns about Chinese influence on the Australian economy is supported by fundamental analysis. This has important policy implications. First, it means that China's economic coercion (if any) may not be very effective in influencing Australian government policy or political activity. Second, according to Goodman [23] and Medcalf [36], the primary driver of the politics of Chinese influence is the attitudes of Australian elites, who have been trying to mobilise the population for purposes including political goals such as strengthening Australia's alliance with the USA, economic goals for sectors ranging from manufacturing to retail to mining, and social goals related to housing or media activity. The analysis reported here suggests that these goals can be achieved at insignificant costs, if any.

Concluding Remarks

Concern over Chinese influence and interference in Australia has grown since 2016, mirrored by a growing debate about the possible effects of Australia's responses on bilateral economic relations. This study uses Google Trends search results to measure concern about Chinese influence in Australia and assess its effect on financial markets. This innovative approach, involving analysis of datasets for January 2016–December 2019 using EGARCH models, finds that the effects of concern about Chinese influence are mainly increased volatility of stock market indices and government bond yields. Depending on the nature of their business, the share prices of individual firms that are heavily reliant on Chinese markets may also be negatively affected. However, the overall effects are essentially insignificant, as evidenced by analysis of the Australian dollar exchange rate. These conclusions are consistent with those based on fundamental analysis.

The conclusions drawn from this study have important implications for policymakers in both Australia and China. In short, any economic coercion from China is unlikely be effective, and Australia's responses to Chinese influence and interference are likely to incur insignificant costs. This study is arguably the first of its kind to explore these issues using rigorous empirical modelling. How to use these conclusions to formulate or adjust policy responses is a topic for further research. As this study conveys new information, the strategic interaction between Australia and China may change accordingly. Any new information may also be reflected in financial markets.

This study adds to the literature on China's influence [49] and provides a novel framework for thinking about Chinese influence in Australia, and more broadly, exploring international political and economic relations. Use of Google Trends data for analysis of the connections between political variables (such as Chinese influence in Australia) and financial markets (as a proxy for the real economy) is possible in many other scenarios.

¹² In May 2020, the Trump government cancelled the visas of Chinese graduate and higher-level students, and is considering a sweeping ban on Chinese Communist Party members' travel to the USA [40].

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Authors' Contributions The author makes full contribution to this article. **Data Availability** The data that support the findings of this study are available from the corresponding author upon reasonable request.

Compliance with Ethical Standards

Conflict of Interest The author declares that he has no conflict of interest.

Code Availability Not applicable.

Appendix. Residual Tests (Table 2-A. Market Indices—ASX 200)

Fig. 3 Standardised residuals

Table 6 Correlogram of standardised residuals

Autocorrelation	Partial correlation		AC	PAC	Q-Stat	Prob
. .	. .	1	−0.032	−0.032	0.2075	0.649
. *	. *	2	0.111	0.110	2.6688	0.263
. .	. .	3	−0.052	−0.046	3.2203	0.359
. .	. .	4	0.012	−0.003	3.2482	0.517
. .	. .	5	−0.009	0.002	3.2641	0.659
. .	. .	6	0.064	0.062	4.1170	0.661
. .	. .	7	−0.021	−0.017	4.2077	0.756
. .	. .	8	0.004	−0.012	4.2103	0.838
. .	. .	9	0.005	0.015	4.2148	0.897

References

Table 7 Correlogram of standardised residuals squared

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
* .	* .	1	−0.072	−0.072	1.0442	0.307
. *	. *	2	0.081	0.076	2.3718	0.305
. .	. .	3	−0.005	0.006	2.3771	0.498
. .	. .	4	0.044	0.039	2.7760	0.596
. .	. .	5	0.049	0.056	3.2733	0.658
. .	. .	6	0.064	0.065	4.1062	0.662
. .	. .	7	0.050	0.052	4.6275	0.705
. .	. .	8	−0.045	−0.050	5.0427	0.753
. .	. .	9	0.011	−0.008	5.0660	0.829

1. ABC News (2017). Power and influence. 5 June. [Online] <https://www.abc.net.au/4corners/power-and-influence-promo/8579844>. Accessed 27 August 2020.

Table 8 Standardised residuals: ARCH tests

Lag	<i>F</i> test (<i>p</i> value)	LM test (<i>p</i> value)
1	0.314	0.311
2	0.339	0.336
3	0.544	0.539
4	0.644	0.638
5	0.645	0.637

Note: The ARCH test is a Lagrange multiplier (LM) test for autoregressive conditional heteroskedasticity (ARCH) in the residuals. The null hypothesis that there is no ARCH up to order *i*. It is a regression of the squared residuals on a constant and lagged squared residuals up to order *i*. The *F*-statistic is an omitted variable test for the joint significance of all lagged squared residuals. The LM test statistic is computed as the number of observations times the *R*-squared from the test regression. The residual tests for others also show no residual autocorrelation and no ARCH effects. The results are not reported in this study, but available upon request

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