Internet Appendix for

"Panda Games: Corporate Disclosure in the Eclipse of Search"

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Appendix IA.1: An Out-of-Sample Illustrative Example for Search Engine Preferences

Due to the unknown nature of their identity and choice of search engine, it is empirically challenging to verify that Chinese investors prefer Google over Baidu when searching information about foreign events by Chinese firms. More importantly, the announcement of a corporate event itself can be endogenous, attracting investors' attention and search volumes (Drake, Roulstone, and Thornock 2012). The content of news can be firm-specific and time-specific, making it difficult to compare over time. With investor base and investor demand for firm-specific information varying across firms and over time, it is difficult to systematically trace investors' preference for search engines over the nature of information.

Nevertheless, in this section of the online appendices, we provide an out-of-sample example to illustrate the time variation in Chinese individuals' preferences for Google and Baidu for non-local information over our sample period. We identify a neutral, international major event that involves foreign information, and importantly, whose schedule is set exogenously. The event has to generate mass attention among individual Chinese, rather than stimulate interest only among a specific group of individuals. The event is thus likely to be representative of Internet search behavior of the general population.

Because attention leads to desire and search for information, we compare the aggregate search frequency in Google and the search volume index of Baidu for the search term "奥运会", which is "Olympic Games" in simplified Chinese. Simplified Chinese is exclusively used by individuals from mainland China. Therefore, search for this term presumably most likely comes from individuals from mainland China.[31]

Google makes the Search Volume Index (SVI) of search terms public via its Google Trends product (http://www.google.com/trends). Google computes a search term's weekly SVI by scaling the number of searches for that term by its time-series average. For a longer horizon such as our sample period, a search term's SVI is available on a monthly basis.

[31] Although many regions in Asia shared the same Chinese heritage (for instance, Hong Kong and Taiwan), the predominant writing form outside the mainland is traditional Chinese. In this case, the traditional Chinese for the Olympic Games is "奧運會".

Baidu provides its own search trend index (http://index.baidu.com) of search terms at a daily frequency. To ensure meaningful comparison between the two search engines, we restrict the search region to mainland China for both Google Trends and the Baidu index, and convert Baidu's search index to a monthly frequency by taking the average of the daily search indices for a given search term over a month.[32] Note that Baidu's search trend index is built upon a different base. To make the graph visually comparable, we scale it by 1,000.

Panel A of Figure IA.1 plots the search trend for search term "奥运会" in Google (shown as in solid blue line) and Baidu (shown as in dotted red line). During the sample period, the Olympic Games occurred twice, exactly two years before and after Google's 2010 exit. It is obvious that prior to Google's exit, search for this term became more intense in Google despite the fact that China was the host for the 2008 games, at a time when patriotism among individual Chinese reached a historical high and the attention for the games became unprecedented. By contrast, Baidu sees a much larger spike in search trend for the same term in 2012 than 2008, suggesting that domestic individuals were forced to rely on Baidu for information on the international event after Google's exit. Panel B of Figure IA.1 compares search trends between Baidu and Google for the search term "Olympic Games". We observe a similar pattern as in Panel A.[33]

Additional Reference:

Drake, Michael, Darren Roulstone, and Jake Thornock, 2012, Investor information demand: evidence from google searches around earnings announcements, *Journal of Accounting Research* 50, 1001-1040.

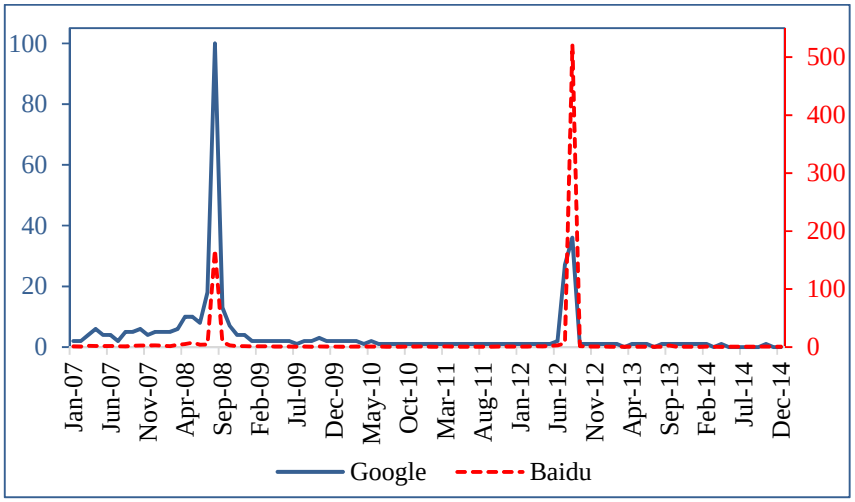
[32] Baidu separates its search index based on searches originated from PCs and those from mobile devices. Since PCs are far more dominant during our sample period, we use the PC-based search index.

[33] Most likely individuals who are fluent in English, for instance, those with college degrees and capable of reading English documents, or foreign expats residing in China, would search the Olympics Games in English. Not surprisingly, the volume is lower in comparison to the one in Panel A.

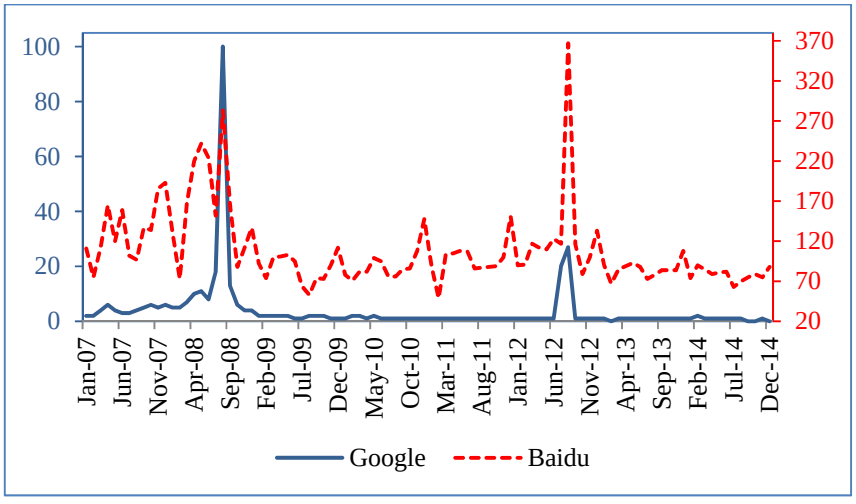
Figure IA.1: Search Volumes of Key Words in Baidu and Google

Panels A and B plot the monthly search volume of search term "奥运会" ("Olympic Games" in Chinese) and "Olympic Games" from January 2007 to December 2014, respectively. The left Y-axis is the search volume index of Google, and the right Y-axis is the search volume index of Baidu (in Panel A, the volumes are in thousands).

Panel A: Search Term "奥运会"



Panel B: Search Term "Olympic Games"



Appendix IA.2: Procedures of Textual Analysis on Disclosures in Chinese Language

We first download the corporate press releases and annual reports in PDF format from iFinD terminals and the websites of stock exchanges. We then convert these PDF files into HTML files using conversion software such as "Solid Converter PDF".

Next, we extract text information using Perl's "HTML: Treebuilder" module. We remove pictures (HTML tag "img"), tables (HTML tag "td"), and blanks between paragraphs (HTML tag "p"), and then transform the content into TXT text by removing all HTML tags.

To identify meaningful words from sentences, we rely on the Simple Chinese Word Segmentation System (SCWS), an open-source Chinese knowledge base focusing exclusively on computerizing and segmenting the characters in Chinese sentences into phrases.[34] UNIX commands are used to screen the TXT files and separate characters into meaningful words.

Lastly, using the HowNet Vocabulary for Sentiment Analysis, we assign sentiment values to the words in the press releases and the M&DA of annual reports. We then run Perl script to compute the frequency of words with different degrees of sentiment to construct "Tone" and "Sentiment".

[34] See http://www.xunsearch.com/scws/

Appendix IA.3: The CSRC's Definition of Material Event

Article 30 of the Administrative Measures for Information Disclosure of Listed Companies, issued by the China Securities Regulatory Commission (CSRC) on January 30, 2007, defines the scope of a major corporate event that requires public disclosure.[35]

If any material event that may considerably affect the trading price of the securities and derivatives of a listed company occurs and that it is not yet known by the investors, the listed company shall immediately give disclosure as well as explanation of the cause, the current situation and the possible consequences.

The term "material event" as mentioned in the preceding paragraph includes the following circumstances:

1. Any major change in the managerial principle or in the business scope of the company;
2. Any decision of the company on major investments or major purchases;
3. Any important agreement concluded by the listed company that might significantly affect its corporate assets, liabilities, rights and interests or operation results;
4. Any major debt incurred by the company or default on any major debt or any obligation to pay a large sum of compensation;
5. Any major deficit or significant losses in the company;
6. Material changes on the external conditions of the company's production operation;
7. Any change of directors, over one-third of the supervisors or managers of the company; or impossibility to perform duties of the chairman of the board of directors or the managers;
8. Any considerable change on the control of the company or on the shareholding of the de facto controllers or any shareholders that holds more than 5% of the corporate stock;
9. Any decision on capital reduction, merger, split-up, dissolution or application for bankruptcy; or falling in bankruptcy process or being ordered to close down in accordance with law;

[35] See https://www.sipf.com.cn:7002/en/lawsandregulations/linvestors/otherlawsandregu/08/32152.shtml for further details.

10. Cancellation or invalidation of any resolution of the shareholders' assembly or the board of directors in relation to an important litigation or arbitration in which the company is involved;
11. Investigation on any alleged offences conducted by the relevant authority or any criminal punishment or major administrative punishment imposed against the company; or any investigation or coercive measure conducted or imposed against the directors, supervisors or senior management of the company as a consequence of alleged violation of law or disciplinary rules;
12. Any newly promulgated law, regulation, provisions or industrial policy that might significantly affect the company;
13. Any resolution of board of directors on new stock offering plan or any other refinancing plan or any share rights incentive plan;
14. Any court resolution prohibiting the controlling shareholders from transferring its shares; or any pledge, freezing of assets, judicially auction, custody, entrustment or voting rights legal limitation on the shares held by any shareholder that holds more than 5% of the corporate stock;
15. Any seizure, retention, freezing, mortgage or pledge on the main assets of the company;
16. Breaking down of the main or all the businesses;
17. Granting of important external guaranty;
18. Any extraneous income that might considerably affect the assets, liabilities, rights and interests or operation results of the company such as a large sum of government subsidy;
19. Any changes on accounting policies or accounting estimates;
20. Any order of the relevant authority or resolution of the board of directors issued or adopted in order to correct or amend errors, disclosure fail to comply with rules or false representations contained in the information previously disclosed;
21. Any other circumstances as prescribed by the CSRC.

Appendix IA.4: Disclosure Optimism and Corporate Transparency: Annual Reports Evidence

IA.4.1. Optimism in Annual Reports and Google's Exit

Using a sample of corporate press releases, we find evidence consistent with that firms adjust their disclosure strategically depending on to what extent investors can acquire firm-specific information independently. To assess the generality of our findings, we analyze another type of mandated corporate disclosure: annual reports of public traded companies. Importantly for our identification, annual reports differ from corporate press releases in that the timing of the annual report is relatively exogenous and the content is not driven by a particular corporate event, which may arise endogenously.

We focus on disclosure through the Management's Discussion and Analysis (MD&A) of the firm's performance, which is designed to bring investors' expectations in line with that of the management. From the CSMAR database, we extract 16,969 firm-year observations of all firms traded on the Chinese A-share market between 2007 and 2014. We exclude financial firms (365 observations), 963 firm-year observations with missing value in size, the market to book ratio, and age, 206 firm-year observations with negative total assets or net assets, 5,351 firm-year observations with less than three years' observations before and after Google's exit, 1,262 firm-year observations in the event year of 2010. Our final sample consists of 8,822 firm-year observations and 1,277 unique firms.

We repeat the textual analysis on the MD&A section of the annual reports of these firms and construct "*Tone*" and "*Sentiment*" for the annual reports of our sample firms from 2007 to 2014. To distinguish between firms that have foreign operations and those that focus their business domestically, we define "*MNC* (*D1*)" as a dummy variable equal to one if, in any given year during the sample period, a firm's foreign sales exceeds 5% of its total sales, and zero otherwise. To consider that firms with pre-determined exposure to foreign operations may respond differently in their disclosure strategies to Google's exit from those previously operating only domestically, we also refine this dummy to "*MNC* (*D2*)", a dummy variable set to one when a firm has any foreign sales during the pre-exit period of 2007-2010. This variable is set to zero if a firm has no foreign sales prior to Google's exit. Alternatively, for each sample

firm, we calculate the fraction of its total sales being foreign sales. Specifically, "*MNC* (*%*)" is computed as the natural logarithm of one plus the fraction of total sales being foreign sales.

We estimate a variation of the main regression in which the dummy "*Foreign Event*" is replaced by the dummies "*MNC* (*D1*)" and "*MNC* (*D2*)", as well as "*MNC* (*%*)", respectively. Table IA-1 reveals that, following a dramatic change in investors' access to foreign information due to Google's exit, Chinese firms that happened to have significant foreign sales prior to the exit become more optimistic in their annual reports (columns 3 and 4). The narratives of annual reports from firms that rely more on foreign sales relative to domestic sales become rosier after Google's exit than those of firms that have a smaller percentage of sales coming from outside mainland China (columns 5 and 6). For instance, a one-standard-deviation increase in the proportion of foreign sales leads to 7.757 higher in "*Tone*" and 0.196 higher in "*Sentiment*" following Google's exit, accounting for 3.797% and 2.768% of the sample mean, respectively.

IA.4.2. Earnings Management and Price Informativeness

We also evaluate the direct consequences of deteriorating disclosure quality in terms of earnings quality and stock price informativeness. We consider accrual-based measures for earnings quality, constructing earnings management proxies based on the modified Jones' model ("*Accrual (MJones)*") and the Kothari-Leone-Wasley's (2005) profit-adjusted model ("*Accrual (KLW)*"). For stock price informativeness, we follow Jin and Myers (2006) and compute the extent to which the stock price reflects firm-specific information relative to the market wide information ("*SPI*"). A higher value of this variable indicates a more informative stock price, thus a more transparent information environment.

Panel A of Table IA-2 suggests that Chinese firms with foreign operations manage earnings to a greater extent after Google's exit in comparison to the pre-exit period, and to those from firms that focus on domestic sales (columns 1-4). Similarly, firms that have disproportionally higher foreign sales are associated with severer earnings management than firms with a lower fraction of foreign sales (columns 5-6).

Similarly, Panel B of Table IA-2 provides clear evidence that the stock price informativeness of firms with significant foreign sales becomes poorer after Google's exit in comparison to the pre-exit period, and to those from firms that focus on domestic sales (columns 1-2). Column 3 indicates that firms that have disproportionally higher foreign sales are associated with poorer transparency than those with a lower fraction of foreign sales. A one-standard-deviation increase in the proportion of foreign sales is linked to 0.043 lower "*SPI*", accounting for 15.09% of the sample mean.

Overall, results in Table IA-2 confirm that firms with more foreign sales experience a rise in earnings management and a decline in stock price informativeness to a greater degree following Google's exit than firms that rely mostly on domestic sales. These findings suggest that a deterioration in disclosure quality is accompanied by a weakening of corporate governance and transparency.

Table IA-1: The Tone of Annual Reports and Google's Exit

The dependent variable is "*Tone*" for columns 1, 3 and 5, and is "*Sentiment*" for columns 2, 4, and 6. The sample period is 2007-2014. The unit of analysis is the annual report observations. "*MNC* (*D*1)" is a dummy variable equal to one if a firm's foreign sales as a fraction of its total sales exceeds 5% during the 2007-2014 period, and zero otherwise. "*MNC* (*D*2)" is a dummy variable equal to one if a firm has any foreign sales during the pre-exit 2007-2010 period, and zero otherwise. "*MNC* (*%*)" is the fraction of a firm's total sales being foreign sales during the 2007-2014 period. All models include a set of control variables ("*Size*", "*Book to Market*", "*Age*", "*ROA*", "*SOE*" and "*Big 4 Auditor*"), a constant, and fixed effects as described in the table whose coefficients are not tabulated. *T*-statistics based on robust standard errors clustered at both the firm and year levels are in parenthesis. ***, **, and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Dependent Variable:	*Tone*	*Sentiment*	*Tone*	*Sentiment*	*Tone*	*Sentiment*
	(1)	(2)	(3)	(4)	(5)	(6)
MNC (*D*1) × *Google Exit*	**4.913****	**0.130***				
	(2.51)	**(1.75)**				
MNC (*D*2) × *Google Exit*			**3.454***	**0.155***		
			(1.85)	**(1.66)**		
MNC (*%*) × *Google Exit*					**2.180*****	**0.055***
					(2.91)	**(1.67)**
MNC (*%*)					1.911***	0.010
					(2.67)	(0.18)
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
# of obs.	8,567	8,567	8,567	8,567	8,567	8,567
R-squared	0.626	0.576	0.630	0.576	0.628	0.576

Table IA-2: Earnings Quality, Information Environment, and Google's Exit

The sample period is 2007-2014. The unit of analysis is firm-year. In Panel A, the dependent variable is accrual-based earnings management proxy based on the modified Jones' model in columns 1, 3 and 5, based on the Kothari-Leone-Wasley (2005) model in columns 2, 4 and 6. In Panel B, the dependent variable is the stock price informativeness ("*SPI*") based on the Jin and Myers (2006) model. "*MNC* (*D1*)" is a dummy variable equal to one if a firm's foreign sales as a fraction of its total sales exceeds 5% during the 2007-2014 period, and zero otherwise. "*MNC* (*D2*)" is a dummy variable equal to one if a firm has any foreign sales during the pre-exit 2007-2010 period, and zero otherwise. "*MNC* (*%*)" is the fraction of a firm's total sales being foreign sales during the 2007-2014 period. All models include a set of control variables ("*Size*", "*Book to Market*", "*Age*", "*ROA*", "*SOE*" and "*Big 4 Auditor*"), a constant, and fixed effects as described in the table whose coefficients are not tabulated. *T*-statistics based on robust standard errors clustered at both the firm and year levels are in parenthesis. ***, **, and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Panel A: Earnings Management

Dependent Variable:	*Accrual* (*MJones*)	*Accrual* (*KLW*)	*Accrual* (*MJones*)	*Accrual* (*KLW*)	*Accrual* (*MJones*)	*Accrual* (*KLW*)
	(1)	(2)	(3)	(4)	(5)	(6)
MNC (*D1*) × *Google Exit*	**0.010****	**0.009****				
	(2.14)	**(2.27)**				
MNC (*D2*) × *Google Exit*			**0.006****	**0.005***		
			(1.98)	**(1.68)**		
MNC (*%*) × *Google Exit*					**0.003****	**0.003*****
					(2.40)	**(2.89)**
MNC (*%*)					**-0.002**	**-0.003***
					(-0.83)	**(-1.74)**
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
# of obs.	8,670	8,670	8,670	8,670	8,670	8,670
R-squared	0.234	0.25	0.271	0.285	0.234	0.250

Table IA-2 continued.

Panel B: Information Environment

Dependent Variable:	*SPI*		
	(1)	(2)	(3)
MNC (*D1*) × *Google Exit*	**-0.035***		
	(-1.86)		
MNC (*D2*) × *Google Exit*		**-0.035***	
		(-1.68)	
MNC (*%*) × *Google Exit*			**-0.013****
			(-2.25)
MNC (*D1*)	-0.051**		
	(-2.40)		
MNC (*D2*)		-0.041*	
		(-1.79)	
MNC (*%*)			-0.011
			(-1.61)
Control Variables	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
# of obs.	8,813	8,813	8,813
R-squared	0.454	0.453	0.453

Appendix IA.5: Managerial Voluntary Disclosure

In our main analyses, we use mandatory disclosure to ensure that our sentiment measures are comparable over time and cross firms. Unlike managerial voluntary disclosure, mandated disclosures of material events are subject to explicit rules and standard format; it helps to eliminate the possibility that the variations in our proxies are driven by differences caused by firms' discussions on various contents and subjects of material events.

The rationale behind our findings, however, would generate a direct implication on managerial voluntary disclosures. On one hand, prior studies have shown that value-maximizing managers actively shape their firms' information environments by voluntarily disclosing more information, which improves liquidity (e.g., Balakrishnan et al. 2014). In the context of our analysis, such managers would boost the frequency of voluntary disclosure to mitigate the opaque information environment brought about by Google's withdrawal, particularly when their firms engage in major events in foreign countries.

Alternative to this shareholder-value maximization view, the agency problem would suggest that managers manipulate through strategic disclosure for their own private benefits. This view would imply that managers take advantage of the opaque information environment with respect to the specific events following Google's exit and harvest personal gains. The findings on insider trading and propensity of fraud corroborate with this view.

In Table IA-3, we directly test whether managers adjust the frequency of voluntary disclosures in response to Google's departure. We find no evidence that they issue more voluntary disclosures following Google's exit when their firms involve in foreign events, which is consistent with the agency problem behind the strategic disclosure we observe. Overall, these findings lend further support for our conjecture that managers manipulate disclosure optimism to take advantage of the rising search cost with respect to foreign information.

Table IA-3: Voluntary Disclosure

The sample period is 2007-2014. The unit of the analysis is the firm-year observations. The dependent variable is "*Voluntary Disclosure*", calculated as the number of managerial voluntary earnings forecasts in a year. All models include a set of control variables ("*Size*", "*Book to Market*", "*Age*", "*ROA*", "*SOE*", and "*Big 4 Auditor*"), a constant, and fixed effects as described in the table whose coefficients are not tabulated. *T*-statistics based on robust standard errors clustered at the firm level are in parenthesis. ***, **, and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Dependent Variable:	*Voluntary Disclosure*		
	(1)	(2)	(3)
Foreign Event × *Google Exit*	-0.062*	0.014	0.011
	(-1.87)	(0.49)	(0.38)
Foreign Event	0.028		
	(1.01)		
Google Exit	0.234***	0.493***	0.403***
	(8.80)	(14.79)	(7.22)
Control Variables	No	No	Yes
Firm FE	No	Yes	Yes
Year FE	No	Yes	Yes
# of obs.	8,182	8,182	8,182
R-squared	0.02	0.47	0.47