Journal of Financial Economics 95 (2010) 425–442

Contents lists available at ScienceDirect

Journal of Financial Economics

journal homepage: www.elsevier.com/locate/jfec

Ownership concentration, foreign shareholding, audit quality, and stock price synchronicity: Evidence from China ☆

Ferdinand A. Gul [a], Jeong-Bon Kim [b,*], Annie A. Qiu [c]

[a] The Hong Kong Polytechnic University, Kowloon, Hong Kong
[b] Department of Accountancy, City University of Hong Kong, Tat Chee Ave, Kowloon, Hong Kong
[c] Citic Security, Beijing, China

ARTICLE INFO

Article history:
Received 28 March 2007
Received in revised form
1 December 2008
Accepted 18 May 2009
Available online 12 November 2009

JEL Classification:
G14
G15
G38

Keywords:
Ownership concentration
State ownership
Foreign ownership
Audit quality
Stock price synchronicity
China

ABSTRACT

This paper investigates the effects of largest-shareholder ownership concentration, foreign ownership, and audit quality on the amount of firm-specific information incorporated into share prices, as measured by stock price synchronicity, of Chinese-listed firms over the 1996–2003 period. We show that synchronicity is a concave function of ownership by the largest shareholder with its maximum at an approximate 50% level. Further, we find that synchronicity is higher when the largest shareholder is government related. We also find that foreign ownership and auditor quality are inversely associated with synchronicity. Finally, we show that the amount of earnings information reflected in stock returns is lower for firms with high synchronicity.

1. Introduction

Roll (1988) finds that a large proportion of stock return variation is not explained by changes in market wide factors or by announcements of value-relevant public information,[1] which he takes as an indication of the amount and rate of private information capitalization into stock prices via informed trading. Built upon this foundation, a growing body of finance literature provides evidence that is consistent with this information-based interpretation of stock price synchronicity or firm-specific return variation. For example, Morck, Yeung, and Yu (2000) examine worldwide synchronicity at the country level, and find that stock price movements are more synchronous in emerging markets with greater impediments to informed trading than in developed markets with fewer impediments. Morck et al. report that China

☆ We have received useful comments from Paul Brockman, Jong-Hag Choi, Ira Horowitz, Li Jiang, Francis Kim, Tiemei Li, Haina Shi, Byron Song, Xiaodong Xu, Cheong H. Yi, Wayne Yu, Liandong Zhang, and participants of Ph.D./DBA research workshops at Concordia University, City University of Hong Kong, The Hong Kong Polytechnic University, and Seoul National University. Special thanks go to Bill Schwert (editor) and an anonymous referee for their insightful comments and suggestions on an earlier version of the paper, and Haina Shi for her excellent research assistance. Kim acknowledges partial financial support from the Social Sciences and Humanities Research Council of Canada via the Canada Research Chair program. All errors are our own.

* Corresponding author. Tel.: +852 3442 7909; fax: +852 3442 0347.
E-mail address: jeongkim@cityu.edu.hk (J.-B. Kim).

[1] Roll (1988) shows that the market model R^2 for his US sample is only about 20% when daily returns are used.

0304-405X/$ - see front matter © 2009 Elsevier B.V. All rights reserved.
doi:10.1016/j.jfineco.2009.11.005

has the second highest synchronicity among 40 sample countries. They argue that poor investor protection in emerging markets such as China discourages informed trading, which, in turn, leads to high synchronicity. Similarly, Jin and Myers (2006) show that synchronicity decreases with a country's accounting transparency. Recent studies by Fernandes and Ferreira (2008, 2009) and Kim and Shi (2009) also find synchronicity to be higher in emerging markets than in developed markets.

Higher stock price synchronicity or lower firm-specific return variation in emerging markets stems from two primary sources. First, while many emerging markets have disclosure regulations of similar quality to those in developed markets, these regulations are often not fully enforced (Ball, 2001; Chan and Hameed, 2006). Second, corporate ownership structure in emerging markets is well characterized by concentrated ownership by founding family members or government, divergence between cash-flow rights and voting rights, and firm affiliations with large business groups via cross shareholdings. This ownership structure is conducive to managerial entrenchment, and provides entrenched controlling owners with incentives and opportunities to extract private control benefits at the expenses of outside investors (Johnson, La Porta, Lopez-De-Silanes, and Shleifer, 2000; Bertland, Mehta, and Mullainathan, 2002). In this environment, the controlling owners have incentives to withhold (or selectively disclose) value-relevant, private information to outside investors to conceal the valuation implication of their self-serving behaviors (Fan and Wong, 2005; Kim and Yi, 2006). As a result, the cost of acquiring private information is likely to be higher, and the profitability of informed trading is lower, in emerging markets as compared to developed markets. This may discourage informed trading and limit the incorporation of firm-specific information into stock prices, leading to more synchronous (or less informative) stock prices.

While the overall evidence in previous studies suggests that China has a relatively high synchronicity because of poor investor protection, it is unclear whether there are discernible differences in synchronicity across firms in China.[2] Unlike the cross-country focus in several prior studies (e.g., Morck, Yeung, and Yu, 2000; Li, Morck, yang, and Yeung, 2004; Jin and Myers, 2006; Fernandes and Ferreira, 2009), our analysis focuses on firm-level investor protection mechanisms within a single country—China. We study the link between synchronicity and corporate governance characteristics unique to China that are deemed to influence the flow of firm-specific information to the market. This linkage comes about through the effects of corporate governance on managerial constraints and incentives, which are likely to influence the information environment and stock prices (Gompers, Ishii, and Metrick, 2003; Bushman, Piotroski, and Smith, 2004; Cremers and Nair, 2005).

We first consider two important aspects of ownership structure in China: ownership concentration of the largest shareholder, and whether the largest shareholder is government related. In transitional economies like China's, most listed firms are partially privatized, and thus, corporate ownership is highly concentrated in the hands of a single investor associated with the central or local government or government-controlled institutions such as state-owned enterprises. For example, about 43% of the outstanding shares for our sample firms are owned by the largest shareholder, of whom 66% are government related. These unique institutional features allow us to evaluate the impact of ownership structure on the information environment of the Chinese market.

We also examine whether the presence of shares issued to foreign investors is associated with synchronicity. Foreign investors, who are typically sophisticated institutional investors, may have superior capabilities, resources, and skills to collect and process value-relevant, firm-specific information (Kim and Yi, 2009). In China, there are two types of share-issuing firms: firms that issue shares exclusively to domestic investors and those that simultaneously issue shares to both domestic and foreign investors. Further, shares issued to foreign investors are traded on two separate markets with different institutional infrastructures such as disclosure regulations and investor protection: (1) the Shanghai or Shenzhen domestic exchange that is considered an emerging market; and (2) the Hong Kong stock exchange that is a well-developed market. These institutional features provide a unique opportunity to examine the impact of foreign ownership on the flow of firm-specific information to outside investors, and to investigate whether this impact differs systematically with the institutional infrastructure of the market on which foreign shares are traded.

Finally, we investigate a hitherto unexplored question of how the quality of external auditors is associated with the extent to which firm-specific information is capitalized into stock prices in an accurate and timely manner. Auditing plays an important role in alleviating information asymmetries between corporate insiders and outside investors, and improves the quality of information contained in financial statements (Dopuch and Simunic, 1982; Becker, DeFond, Jiambalvo, and Subramanyam, 1998; Kim, Chung, and Firth, 2003). Firms with high-quality auditors are therefore expected to provide more credible, firm-specific information and better investor protection, and thus, greater firm-specific information capitalization or lower synchronicity, compared to other firms. The extant literature, however, has failed to consider whether auditor quality is associated with synchronicity, though auditors are instrumental in the production of reliable, firm-specific information. We aim to fill this void by examining the issue in an environment where investor protection is relatively poor and Big 4 audits are relatively uncommon.[3]

[2] Previous governance research suggests that there is considerable disparity in corporate governance quality and characteristics, including ownership structures across firms, in emerging markets (e.g., Klapper and Love, 2004; Allen, Qian, and Qian, 2005). These differences are likely to affect voluntary disclosures and corporate transparency, which in turn could affect the information environment.

[3] In developed markets such as the NYSE and Amex, most listed firms engage Big 4 auditors. In the domestic Chinese markets, however, the Big 4 audit only a small proportion of listed firms. In our sample of Chinese-listed firms, the Big 4 market share is about 7.3%, while in the US it is well over 90% (Choi, Kim, Liu, and Simunic, 2008). See DeFond,

We point out three primary findings. First, largest-shareholder ownership concentration is an important factor determining synchronicity. Specifically, we find that synchronicity is a concave function of the percentage of shares held by the largest shareholder: it initially increases at a decreasing rate, and then begins to decrease when the percentage reaches beyond a certain threshold. Moreover, we show that synchronicity is higher, ceteris paribus, when the largest shareholder is government related. This is consistent with the view that the government ownership leads to poor protection for minority shareholders and opaque financial disclosures (Shleifer and Vishny, 1994), and thus, stock prices are less reflective of firm-specific information relative to market wide or industry wide information.

Second, we show that synchronicity is lower for firms that issue shares to both domestic and foreign investors than for firms that issue shares exclusively to domestic investors, suggesting that the presence of foreign investors improves the information environment. Moreover, we find that synchronicity is lower for firms issuing foreign-investor shares to the more developed Hong Kong market than for firms issuing foreign-investor shares to the less developed Shanghai or Shenzhen exchange. This corroborates the view that strong institutional infrastructures facilitate firm-specific information capitalization into stock prices (e.g., Fernandes and Ferreira, 2008).

Third, we find that the appointment of international Big 4 auditors is associated with lower synchronicity, which supports the view that a high-quality auditor helps facilitate the flow of more credible, firm-specific information to the market. Finally, we also show that synchronicity is inversely related to the amount of earnings information reflected in stock returns or the earnings-response coefficient.

Our study contributes to the extant literature in several ways. First, we provide a unique focus on firm-level governance characteristics in an important emerging market—China. Our results help us better understand the effects of firm-level investor protection mechanisms on firm-specific information capitalization in an environment where overall country-level investor protection is relatively poor.[4] Second, our study is one of the few, if not the first, to examine, in an emerging market, the informational effect of ownership structure as reflected in largest-shareholder ownership concentration, government-related ownership, and foreign ownership. In particular, our evidence on a concave relation between synchronicity and large-shareholder ownership contributes to the ongoing debate on whether ownership concentration leads to managerial entrenchment or incentive alignment. Third, to our knowledge, our study is the first to examine how audit quality relates to firm-specific information capitalization in an emerging market. Finally, our study is related to Ferreira and Laux (2007) who investigate the impact of anti-takeover provisions for US firms on idiosyncratic volatility which is an inverse measure of synchronicity. We extend and complement their study by providing evidence that both firm-level governance and institution-level investor protections influence the information environment of the Chinese market.

The remainder of the paper is structured as follows. Section 2 develops our research hypotheses. Section 3 explains how we measure stock price synchronicity in the context of the Chinese market, and specifies our empirical models used for hypothesis testing. Section 4 describes our sample and data sources, and presents descriptive statistics. Section 5 reports results of our main regressions, while Section 6 reports results of our robustness checks. In Section 7, we perform further analyses by examining the relation between stock price synchronicity and earnings informativeness. The final section concludes the paper.

2. Hypothesis development

2.1. Ownership concentration and stock price synchronicity

Ownership structure is a key determinant of corporate governance (Shleifer and Vishny, 1997; La Porta, Lopez-de-Silanes, and Shleifer, 1998, 2000). As in other East Asian countries, public firms in China are characterized by highly concentrated ownership structures. In principle, concentrated ownership could have two opposing effects on synchronicity, depending on whether the managerial entrenchment effect or the incentive alignment effect is dominant. Under the managerial entrenchment perspective, concentrated ownership provides controlling shareholders with an incentive and/or opportunity to divert firm resources at the expense of outside shareholders (e.g., Morck, Yeung, and Yu, 2000; Claessens, Djankov, Fan, and Lang, 2002; Fan and Wong, 2002). Entrenched controlling shareholders can utilize their effective control over the firm to engage in self-dealing transactions which allow them to extract private control benefits (e.g., Shleifer and Vishny, 1989; Morck, 1996). For example, Shleifer and Vishny model managerial entrenchment, and demonstrate that entrenched managers can utilize relationship-specific contracting or investments to make it difficult for outside investors to replace them.

Entrenched controlling shareholders have an incentive to cover up their self-serving behaviors, or to limit related information leakage, by withholding unfavorable information or selectively disclosing such information that helps them camouflage their self-serving behaviors, and/or opportunistically timing the release of value-relevant, private information to the market. Concentrated control power, thus, deters the flow of firm-specific information to the market, contributing to more opaque

(*footnote continued*)
Wong, and Li (2000) and Gul, Kim, and Qiu (2007) for a discussion of the Chinese audit market.

[4] Himmelberg, Hubbard, and Palia (1999) suggest that firm-level characteristics affect the level of protection for investors. Klapper and Love (2004) argue that firm-level corporate governance is important because many country-level investor protection laws may not be binding and firms may have certain flexibilities. They find in their emerging-market studies that firm-level governance works better when country-level governance is weak.

information environments.[5] Meanwhile, outside investors without adequate protection may have to bear the relatively higher costs of acquiring and processing private information to overcome the information opacity related to concentrated ownership, and to avoid the risk of being exploited by the controlling shareholders. The high cost associated with private information search, however, discourages informed trading, and thus, impedes the incorporation of firm-specific information into share prices (e.g., Roll, 1988; Morck, Yeung, and Yu, 2000; Fernandes and Ferreira, 2009). As a result, the stock prices of firms with high ownership concentration become less informative or more synchronous. One can thus expect that under the entrenchment perspective, synchronicity is positively associated with ownership concentration, ceteris paribus.

Under the incentive alignment perspective, however, ownership concentration can facilitate the alignment of interests between controlling and minority shareholders (Grossman and Hart, 1980; Shleifer and Vishny, 1986, 1997; Mitton, 2002; Lins, 2003). For example, Mitton (2002) reports significantly better stock price performance during the Asian financial crisis of 1997–1998 for firms with high ownership concentration. Gomes (2000) argues that high concentration can serve as a credible commitment made by controlling shareholders toward a reputation of not expropriating the interests of minority shareholders. The implication, then, is that concentrated ownership may encourage the controlling shareholders to voluntarily disclose more and better firm-specific information for the benefit of minority shareholders. This improved cost-benefit tradeoff facilitates more informed trading, which, in turn, leads to more information being impounded into stock prices (Grossman and Stiglitz, 1980). One can thus expect that under the alignment perspective, synchronicity is inversely related to ownership concentration, ceteris paribus.

Empirical evidence supporting the alignment perspective focuses either on the US market where ownership structures are quite diffuse, or on non-management blockholders. In contrast, much of the evidence supporting the entrenchment perspective comes from emerging markets with highly concentrated ownerships and where the divergence between cash-flow rights and voting rights is relatively large. In view of the unique institutional environment in China where large controlling shareholders typically exercise nearly full control over major corporate decisions, including disclosure policies, and directly engage in the managerial process, we expect the entrenchment effect to dominate the alignment effect. The entrenchment effect can be mitigated, however, when concentration extends beyond a certain level and the firm assumes the characteristics of a "private" company owned by the dominant shareholders. Fan and Wong (2002, p. 406) argue that "once the controlling owner obtains effective control of the firm, any increase in voting rights does not further entrench the controlling owner, but his/her cash-flow rights in the firm mean that it will cost more to divert the firm's cash flows for private gain."

We predict that synchronicity is a concave function of ownership concentration, proxied by the percentage of shares held by the largest shareholder at the beginning of a fiscal year. This is so because the entrenchment effect initially dominates the incentive-alignment effect, but the latter becomes increasingly salient relative to the former, as concentration increases. We thus test the following hypothesis in alternative form:

H1a. *Stock price synchronicity initially increases at a decreasing rate as the percentage of shares held by the largest shareholder increases, but it begins to decrease as the percentage continues to increase beyond a certain level, ceteris paribus.*

We also investigate whether synchronicity is associated with the nature of the largest shareholder in Chinese-listed firms. Despite the continuing effort of the Chinese government to reform its financial system and related legal/regulatory mechanisms,[6] many listed firms remain partially privatized, and are still closely tied to the government. For the majority of these firms, the largest shareholder is a central government agency, a regional government, or a large state-owned enterprise. Since government ownership is likely to lead to inefficient corporate governance,[7] protection for minority shareholders may be weaker when the largest shareholder of a firm is government related. As such, the entrenchment effect of ownership concentration is likely to be more pronounced when the largest shareholder is government related. We thus test the following hypothesis in alternative form:

H1b. *Stock price synchronicity is higher when the largest shareholder is government related, ceteris paribus.*

2.2. Foreign ownership and stock price synchronicity

All Chinese-listed firms issue tradable shares, called A-shares, to domestic investors, while some of these firms also issue shares to foreign investors. The two most popular foreign shares are B-shares, traded on the Shanghai or Shenzhen stock exchange, and H-shares, traded in Hong Kong. The regulatory requirements and information environments for firms with foreign shareholders differ from those for firms with only domestic shareholders. During the sample period, 1996–2003, firms that exclusively issued A-shares were required to prepare financial reports in accordance with domestic accounting standards (DAS). In contrast, A-share firms that simultaneously issued B-shares or H-shares were required to provide financial reports in compliance with

[5] Using a large sample of Korean firms, Kim and Yi (2006) provide evidence suggesting that controlling shareholders engage in opportunistic earnings management in an attempt to hide true underlying earnings performance.

[6] The Chinese government enacted the Securities Law in 1998. Since then, the Securities Law has been amended twice, in 2004 and 2006, to strengthen disclosure requirements, the level of legal protection of outside investors, and associated legal liabilities of listed companies.

[7] See Shleifer and Vishny (1994) and Shleifer (1998) for more detailed discussions on the issue.

International Financial Reporting Standards (IFRS) or Hong Kong Generally Accepted Accounting Principles (GAAP). These IFRS- or Hong Kong GAAP-based reports must be audited by international Big 4 auditors, while DAS-based reports may be audited by domestic non-Big 4 auditors.[8] In addition, foreign investors are usually perceived to be more sophisticated than domestic investors in terms of investment experience and the ability to collect, process, and analyze value-relevant information.

Despite strict trading segmentation between domestic A-shares and foreign B- or H-shares, A-shareholders and B- or H-shareholders can access each other's financial reports.[9] Chui and Kwok (1998) and Chen, Firth, and Kim (2002) provide evidence of information exchanges between domestic and foreign investors. Further, when firms issue both foreign and domestic shares, A-shareholders have access to and can inject into their domestic trades the firm-specific information embodied in the foreign shares. Evidence further shows that foreign ownership is associated with higher corporate transparency and lower information asymmetries (e.g., Kang and Stulz, 1997; Jiang and Kim, 2004; Kim and Yi, 2009). One can therefore expect the amount of firm-specific information capitalized into share prices to be greater for firms issuing *both* A-shares and B- or H-shares than for firms issuing A-shares only. We thus test the following hypothesis in alternative form:

H2a. *Stock price synchronicity is lower for firms issuing shares to both domestic and foreign investors than for firms issuing shares to domestic investors only, ceteris paribus.*

Compared with the domestic stock markets, the Hong Kong market is more mature and efficient, and it has better investor protection mechanisms. Chinese firms issuing both A- and H-shares (hereafter A+H shares) are thus exposed to two different institutional-level investor protection environments, namely Hong Kong and China. Chinese firms issuing both A-shares and B-shares (hereafter A+B shares) are exposed only to China's institutional environment (Brockman and Chung, 2003). This institutional feature provides a unique opportunity to test for the effect of *institution-level* difference in investor protection on firm-specific return variation. Given that firms with A+H shares are subject to better institution-level investor protection, greater disclosure requirements, and stricter legal and regulatory enforcement than firms with A+B shares, we expect that the former have more firm-specific information reflected in their share prices than the latter. We thus hypothesize in alternative form:

H2b. *Stock price synchronicity is lower for firms issuing A+H shares than for firms issuing A+B shares, ceteris paribus.*

2.3. Audit quality and stock price synchronicity

External audits reduce information asymmetries between managers and shareholders by lending credibility to financial statements (Dopuch and Simunic, 1982). But auditing effectiveness varies with auditor quality. As agency costs increase, there is an increasing demand for high-quality audits (e.g., Watts and Zimmerman, 1986; DeFond, 1992). Audit quality is generally defined as the joint probability of detecting and reporting financial statement errors (DeAngelo, 1981; Choi, Kim, Liu, and Simunic, 2008). There is ample evidence on the positive role of auditing and audit quality in limiting biased financial reporting (e.g., Becker, DeFond, Jiambalvo, and Subramanyam, 1998; Kim, Chung, and Firth, 2003). Among others, Fan and Wong (2005) report that Big 4 auditors play a corporate governance role in emerging markets with highly concentrated ownership structures. High-quality auditors may "force" their client firms to disclose more detailed and better quality, firm-specific information in a timelier manner, which leads to better protection for minority shareholders.

External auditors, like financial analysts, may be viewed as playing an information intermediation role between controlling shareholders and outside minority shareholders. Their professional competence and familiarity with client business facilitates dissemination of more reliable, firm-specific information to the market. Financial analysts provide more market wide and/or industry wide information as opposed to firm-specific information, both in the US (Piotroski and Roulstone, 2004) and in other markets (Chan and Hameed, 2006; Fernandes and Ferreira, 2008; Kim and Shi, 2009). Their information production activities thus facilitate intra-industry information transfer, which, in turn, increases synchronicity. Unlike financial analysts, however, the primary role of the auditor is to assure the credibility of accounting reports and the firm-specific information contained therein. One can therefore expect that synchronicity is lower for firms with high-quality auditors than for firms with low-quality auditors. Given the scarcity of evidence on the issue, we test the following hypothesis in alternative form:

H3. *Stock price synchronicity is lower for firms with international Big 4 auditors than for firms with domestic non-Big 4 auditors, ceteris paribus.*

[8] Since the B-share market was first established in 1991, trading on the B-share market has been strictly restricted to foreign investors. Recently, China has gradually relaxed the strict segmentation between A- and B-share markets in an attempt to liberalize its stock markets for foreign investors. One of the important steps toward this market-liberalization effort was the introduction of the Qualified Foreign Institutional Investors (QFII) scheme by the China Securities Regulatory Commission (CSRC) in 2002. Under the QFII, certain foreign institutional investors, with some restrictions, were "qualified" to trade shares on both A- and B-share markets on the basis of their business nature, track record, firm size, and firm age. Since the QFII scheme was not successful in attracting a significant number of foreign institutional investors, the CSRC in 2006 took two important steps. First, the CSRC further relaxed the entry barrier for foreign institutional investors to the A-share markets (under the QFII scheme) so that more foreign institutional investors could be classified as QFII. Second, a new scheme called the Qualified Domestic Institutional Investors (QDII) scheme was introduced in an attempt to facilitate the outflow of domestic capital to foreign capital markets. Under this scheme, QDII (usually mutual funds, banks, and insurance companies) are allowed to trade in foreign equity markets, and to sell certain financial products to domestic individual investors who are not allowed to trade in foreign equity markets.

[9] The annual report of a firm issuing B-shares includes A-share accounts as supplemental information. A reconciliation of earnings based on domestic accounting standards to earnings based on IFRS is also disclosed in the B-share annual report. For more detailed discussions on the issue, see Chen, Firth, and Kim (2002).

3. Measurement of variables and model specification

3.1. Measurement of stock price synchronicity

To measure our dependent variable, stock price synchronicity, we need to estimate the market model, which allows us to decompose total return variations into two components: those tied to common (market wide and/or industry wide) factors and those tied to firm-specific factors. The institutional features of Chinese markets lead us to posit four different specifications of the market model from which we derive two alternative measures of synchronicity.

For all three types of share-issuing firms in our sample (i.e., firms with A-shares only, with A+B shares, and with A+H shares), we first estimate the following market model for each fiscal year:

$$RET_{it} = \alpha + \beta_1 MKTRET_t + \beta_2 MKTRET_{t-1} + \beta_3 INDRET_t + \beta_4 INDRET_{t-1} + \varepsilon_{it}, \quad (1)$$

where, for firm i and day t, RET denotes the daily return on A-shares traded on either the Shanghai or Shenzhen exchange; and $MKTRET$ and $INDRET$ denote the value-weighted A-share market return and industry return, respectively[10]; and ε represents unspecified random factors. This A-share market return is based on the composite (value-weighted) A-share index which reflects A-share price movements in both the Shanghai and Shenzhen exchanges.[11] The industry return is created using all firms within the same industry with firm i's daily return omitted.[12] In Eq. (1), we include lagged industry and market returns to alleviate concerns over potential non-synchronous trading biases that may arise from the use of daily returns for estimating the market model (Scholes and Williams, 1977; French, Schwert, and Stambaugh, 1987).

Estimation of Eq. (1) allows us to effectively isolate total return variations tied to (domestic) market wide and industry wide factors from those tied to firm-specific factors. However, Chinese stock returns may also be influenced by world market factors. Further, returns on stocks of A+B (A+H) share firms are likely to co-move with B-share (H-share) market factors in addition to A-share market factors. To address these issues, we also estimate, for each fiscal year, a two-factor market model for firms with only domestic A-shares using Eq. (1a), and estimate two different three-factor market models for firms with A+B shares and firms with A+H shares using Eqs. (1b) and (1c), respectively:

$$RET_{it} = \alpha + \beta_1 MKTRET_t + \beta_2 WRDRET_t + \varepsilon_{it} \quad (1a)$$

$$RET_{it} = \alpha + \beta_1 MKTRET_t + \beta_2 MKTRET_t^B + \beta_3 WRDRET_t + \varepsilon_{it} \quad (1b)$$

$$RET_{it} = \alpha + \beta_1 MKTRET_t + \beta_2 MKTRET_t^H + \beta_3 WRDRET_t + \varepsilon_{it}, \quad (1c)$$

where, for firm i and day t, $WRDRET$ is the world market return that is computed using the MSCI World index[13]; $MKTRET^B$ is the value-weighted B-share market return that is computed using the composite (value-weighted) B-share index which reflects B-share price movements in both the Shanghai and Shenzhen exchanges; $MKTRET^H$ is the value-weighted Hong Kong market return that is computed using the (value-weighted) Hang Seng index; and other variables are as defined earlier.

In estimating Eq. (1) and Eqs. (1a), (1b) and (1c), we require that daily return data be available for at least 200 trading days in each fiscal year. As in other studies, stock price synchronicity is defined as the ratio of common return variation to total return variation, which is equivalent to R^2 of the market model used. To circumvent the bounded nature of R^2 within [0, 1], we use a logistic transformation of R_i^2:

$$SYNCH_i = \log\left(\frac{R_i^2}{1-R_i^2}\right),$$

where $SYNCH_i$ is our empirical measure of *annual* synchronicity for firm i.

For our empirical tests, we obtain two alternative measures of $SYNCH_i$: one using R_i^2 from Eq. (1) for all three types of share-issuing firms in our sample, denoted by $SYNCH(1)$; and the other using R_i^2 from Eqs. (1a) to (1c) for firms with A-shares only, with A+B shares, and with A+H shares, respectively, denoted by $SYNCH(1a,b,c)$.

3.2. Empirical models for hypothesis testing

To test for the effects on synchronicity of ownership concentration (H1a) and of the nature of the largest shareholder (H1b), we estimate the following regression:

$$SYNCH_{i,t} = \gamma_0 + \gamma_1 TOPHOLD_{i,t}^2 + \gamma_2 TOPHOLD_{i,t} + \gamma_3 TOPGOV_{i,t} + \sum_k \gamma_k CONTROL_{i,t}^k + (YearDummies) + (IndustryDummies) + \varepsilon_{i,t}, \quad (2)$$

where, for firm i and year t, $TOPHOLD$ represents the percentage of shares held by the largest shareholder at the beginning of the fiscal year; $TOPGOV$ equals one when

[10] In China, A-shares are listed on either the Shanghai or Shenzhen stock exchange. The composite value-weighted A-share index is constructed using prices of A-shares listed on both exchanges. The value-weighted A-share market return equals the change in the composite value-weighted A-share indexes from day t to day t–1 deflated by the composite value-weighted A-share index on day t–1.

[11] The composite A-share index data are extracted from the China Stock Market and Accounting Research (CSMAR) database.

[12] We adopt the 13-industry classification made by the China Securities Regulatory Commission (CSRC).

[13] The MSCI (Morgan Stanley Capital International) World index is a world market index that is based on stock prices of listed companies representative of 22 stock markets in North America, Europe, and the Asia/Pacific region, and is weighted by the market capitalization of each constituent market. The index data are extracted from the Datastream database.

the largest shareholder is government related, and zero otherwise; *CONTROL* denotes a set of control variables; and ε represents unspecified random factors.

In Eq. (2), we include a quadratic term, $TOPHOLD^2$, to see if the relation between *SYNCH* and *TOPHOLD* is concave. When the relation is concave as hypothesized, with the incentive alignment effect eventually dominating the managerial entrenchment effect, then $\gamma_1 < 0$ and $\gamma_2 > 0$ (H1a). Hypothesis H1b translates as $\gamma_3 > 0$.

Following previous related research (Piotroski and Roulstone, 2004; Chan and Hameed, 2006; Ferreira and Laux, 2007), we include a total of seven control variables that are known to influence synchronicity, that is: annual trading volume turnover (*VOL*), firm size (*SIZE*), leverage (*LEV*), earnings volatility (*STDROA*), market-to-book ratio (*M*/*B*), the number of firms in the industry to which a firm belongs (*INDNUM*), and industry size (*INDSIZE*). Year and industry dummies are included to control for potential year and industry fixed effects. The Appendix provides the exact definitions of all variables included in the regression.

To test for the effect of foreign ownership on synchronicity (H2a and H2b), we estimate the following regression:

$$SYNCH_{i,t} = \phi_0 + \phi_1 HSHARE_{i,t} + \phi_2 BSHARE_{i,t} + \sum_k \phi_k CONTROL^k_{i,t} + (YearDummies) + (IndustryDummies) + \varepsilon_{i,t}, \quad (3)$$

where for firm *i* and year *t*, *HSHARE* equals one for A-share firms simultaneously issuing H-shares, and zero otherwise; *BSHARE* equals one for A-share firms simultaneously issuing B-shares, and zero otherwise; and other variables are as defined earlier. Hypothesis H2a translates as $\phi_1 < 0$ and $\phi_2 < 0$. Further, $\phi_1 < \phi_2 < 0$ is consistent with H2b.

Finally, to test for the effect of auditor quality on synchronicity (H3), we specify the following regression:

$$SYNCH_{i,t} = \lambda_0 + \lambda_1 BIG4_{i,t} + \lambda_2 LOCAL_{i,t} + \sum_k \lambda_k CONTROL^k_{i,t} + (YearDummies) + (IndustryDummies) + \varepsilon_{i,t}, \quad (4)$$

where *BIG*4 equals one for firms with an international Big 4 auditor, and zero otherwise; *LOCAL* is an indicator variable that equals one for firms with local auditors, and zero otherwise; and other variables are as defined earlier. In the Chinese context, we define Big 4 auditors as joint ventures of international Big 4 firms and domestic auditors.[14] If the Big 4 are more effective facilitators of firm-specific information flows than other auditors (H3), then $\lambda_1 < 0$.

In Eq. (4), we include an additional control variable, *LOCAL*, to isolate the synchronicity effect of high-quality audits by the Big 4 from potential auditor location effects. Specifically, in China, there are two types of non-Big 4 auditors: "local" and "non-local." A local auditor is a domestic non-Big 4 auditor located in the administrative region that houses its clients, while a non-local auditor is a domestic auditor located in an administrative region different from that of its clients. Previous research has shown audit quality to be lower for local auditors than for non-local auditors (Chan, Lin, and Mo, 2006; Gul, Kim, and Qiu, 2007); this stems from local auditors being more susceptible to the political influence of local governments than non-local auditors.[15]

4. Sample

4.1. Sample and data sources

Our sample period covers the eight-year period, 1996–2003. We extract stock return and accounting data from the China Stock Market and Accounting Research (CSMAR) database. Ownership-related data as to shares held by the largest to the fifth-largest shareholders and their identity (government related or not) are manually collected, mainly from annual reports of individual companies, and in some cases supplemented from other data sources, including company Web sites, the Genius Securities Information System database, The Shenzhen Stock Exchange Fact Book, and Annual Statistics of the Shanghai Stock Exchange. Auditor information is collected from "Who Audits China" published by the China Securities Regulatory Commission (CSRC) for the period 1996–2000, and is also manually collected from internet sources for the period 2001–2003.[16] We limit our sample to non-financial firms. The final sample comprises 6,120 firm-year observations for 1,142 firms.

Panel A of Table 1 shows the distribution of our sample firms across industries based on CSRC industry classification. Over 58% of the sample is from the manufacturing sector, followed by 8.67% from commerce, and 7.53% from conglomerates. Firms in the culture and media industries account for less than 1% of the total. Panel B reports the distribution of our sample firms by year. The number of firms increases monotonically over the eight-year sample period, reflecting the steady growth of the Chinese stock market.

4.2. Descriptive statistics

Table 2 presents descriptive statistics. In the table, $R^2(1)$ and *SYNCH*(1) are the R^2 statistic and the synchronicity measures, respectively, computed from Eq. (1), while $R^2(1a, b, c)$ and *SYNCH*(1*a*, *b*, *c*) are the same measures, computed from Eqs. (1a) to (1c). The mean and median $R^2(1)$ are 0.454 and 0.462, respectively, while the mean and median $R^2(1a, b, c)$ are 0.437 and

[14] In mainland China, international Big 4 audit firms are allowed to do business by forming joint ventures with domestic audit firms, while in Hong Kong they can do business independently.

[15] Prior to 1997, domestic auditors in China were affiliated with local governments or government-related institutions such as universities. In 1997, the Chinese government introduced the Auditor Disaffiliation Program (ADP) in an attempt to sever the political tie between auditors and their sponsoring bodies, such as local governments and government-related institutions. Evidence suggests that local government has exercised some political influence over local auditors even after the ADP was implemented (Yang, Tang, Kiligore, and Hong, 2001; Wang, Wong, and Xia, 2008; Gul, Kim, and Qiu, 2007).

[16] http://www.csrc.gov.cn and http://www.cinfo.com.cn.

Table 1
Sample distribution.

Panel A shows the distribution of sample firms across industries based on the "guidance on the industry category of listed companies" issued by the China Securities Regulatory Commission (CSRC), where A=Agriculture, B=Mining, C=Manufacturing, D=Electricity, gas, and water, E=Building and construction, F=Transportation and logistics, G=Information technology, H=Commerce, I=Real estate, J=Service, K=Culture and media, L=Conglomerate. Panel B shows the distribution by year.

Panel A: *Industry distribution*													
	A	B	C	D	E	F	G	H	I	J	K	L	Total
#	30	15	664	43	18	47	57	99	34	39	10	86	1142
%	2.63	1.31	58.15	3.77	1.58	4.12	4.99	8.67	2.98	3.42	0.88	7.53	100
Panel B: *Yearly distribution*													
	1996		1997		1998		1999		2000		2001		Total
#	298		341		538		747		867		972		6120
%	4.87		5.57		8.79		12.21		14.17		15.88		100

	2002	2003	Total
#	1140	1217	6120
%	18.63	19.89	100

Table 2
Descriptive statistics.

$R^2(1)$ and *SYNCH*(1) refer to the R^2 statistic and the stock price synchronicity measures, respectively, that are estimated using Eq. (1), while $R^2(1a, b, c)$ and *SYNCH*(1*a*, *b*, *c*) refer to the same measures that are estimated using Eqs. (1a), (1b), and (1c) for firms with A-shares only, firms with A- and B-shares, and firms with A- and H-shares, respectively. All other variables are as defined in the Appendix A.

Variables	Mean	Std. dev.	5th Pctl.	25th Pctl.	Median	75th Pctl.	95th Pctl.
$R^2(1)$	0.454	0.180	0.145	0.327	0.462	0.588	0.741
$R^2(1a, b, c)$	0.437	0.179	0.134	0.307	0.439	0.570	0.734
SYNCH(1)	−0.232	0.841	−1.776	−0.724	−0.151	0.354	1.053
SYNCH(1*a*, *b*, *c*)	−0.316	0.882	−1.862	−0.815	−0.247	0.281	1.016
TOPHOLD	0.428	0.176	0.162	0.289	0.417	0.571	0.718
STATE	0.316	0.261	0.000	0.000	0.332	0.542	0.711
TOPGOV	0.665	0.472	0.000	0.000	1.000	1.000	1.000
FOREIGN	0.038	0.104	0.000	0.000	0.000	0.000	0.318
HSHARE	0.040	0.195	0.000	0.000	0.000	0.000	0.000
BSHARE	0.123	0.328	0.000	0.000	0.000	0.000	1.000
BIG4	0.073	0.260	0.000	0.000	0.000	0.000	1.000
LOCAL	0.682	0.466	0.000	0.000	1.000	1.000	1.000
VOL	1.245	1.192	0.226	0.501	0.877	1.582	3.400
SIZE	20.832	0.966	19.350	20.207	20.809	21.410	22.439
LEV	0.470	3.656	0.167	0.351	0.481	0.634	1.503
STDROA	0.206	1.096	0.000	0.011	0.083	0.165	0.474
M/B	1.801	2.646	−2.566	1.055	1.825	2.899	5.418
INDN	5.346	1.316	3.295	4.263	6.182	6.548	6.681
INDSIZE	26.552	1.419	24.347	25.234	27.190	27.852	28.120

0.439, respectively. These statistics are comparable to the reported mean R^2 of 0.453 for China in the sample of Morck, Yeung, and Yu (2000), and are more than double the reported mean R^2 of 0.193 for the US sample of Piotroski and Roulstone (2004). The mean and median *SYNCH*(1) are −0.232 and −0.151, respectively, while the mean and median *SYNCH*(1*a*, *b*, *c*) are −0.316 and −0.247, respectively. Our measure of *SYNCH*(1) is computed using the same specification of the market model used in Piotroski and Roulstone (2004), who report the mean and median of −1.742 and −1.754, respectively, which are much lower than our corresponding measures. This suggests that, compared with US firms, stock prices of Chinese-listed firms tend to co-move, to a greater (lesser) extent, with market wide and/or industry wide information (firm-specific information). Both R^2 and *SYNCH* display considerable cross-sectional variations as reflected in the relatively high standard deviations and inter quartile ranges. For example, *SYNCH*(1) is −0.724 at the lower quartile, while it is 0.354 at the upper quartile, with a standard deviation of 0.841. Given that all firms in our sample come from a single country, this significantly high variation in synchronicity across firms suggests that the flow of firm-specific information to the market varies widely across firms within the country.

Table 2 also shows that, on average, the largest shareholder holds 42.8% of shares outstanding, and it reveals the highly concentrated ownership structure in China. The overall mean (median) percentage of state ownership in the sample is 31.6% (33.2%). For 66.5% of firms, the largest shareholder is government related, suggesting that the government plays an important role in controlling Chinese-listed firms. On average, foreigners own only 3.8% of our sample firms, reflecting a low level

Table 3
Correlation matrix.
All variables are as defined in the Appendix A. Superscripts a, b, and c stand for statistical significance at the 1%, 5%, and 10% levels, respectively.

	SYNCH (1*a*, *b*, *c*)	*TOP-HOLD*	*TOP-GOV*	*STATE*	*FORE-IGN*	*H-SHARE*	*B-SHARE*	*BIG4*
SYNCH(1)	0.971[a]	0.099[a]	0.066[a]	0.043[a]	−0.016	−0.011	−0.009	−0.041[a]
SYNCH (1*a*, *b*, *c*)	1	0.091[a]	0.066[a]	0.043[a]	−0.007	−0.018	−0.005	−0.037[a]
TOPHOLD		1	0.255[a]	0.459[a]	−0.018	0.091[a]	−0.047[a]	0.084[a]
TOPGOV			1	0.402[a]	0.048[a]	0.057[a]	0.015	0.033[b]
STATE				1	0.025[b]	0.064[a]	0.003	0.030[b]
FOREIGN					1	0.435[a]	0.639[a]	0.377[a]
HSHARE						1	−0.076[a]	0.273[a]
BSHARE							1	0.174[a]
BIG4								1
	LOCAL	*VOL*	*SIZE*	*LEV*	*STD-ROA*	*M/B*	*INDN*	*INDSIZE*
SYNCH(1)	0.002	−0.178[a]	0.134[a]	0.014	−0.003	−0.157[a]	−0.048[a]	−0.012
SYNCH (1*a*, *b*, *c*)	−0.001	−0.177[a]	0.108[a]	0.012	−0.007	−0.162[a]	−0.009	0.015
TOPHOLD	0.041[a]	−0.215[a]	0.184[a]	−0.020	0.049[a]	−0.111[a]	0.139[a]	0.158[a]
TOPGOV	0.013[a]	−0.195[a]	0.158[a]	0.024[c]	−0.012	−0.088[a]	0.122[a]	0.159[a]
STATE	0.016[a]	−0.137[a]	0.124[a]	0.027[b]	0.018	−0.058[a]	0.118[a]	0.142[a]
FOREIGN	−0.124[a]	−0.206[a]	0.159[a]	0.021	−0.026[c]	−0.276[a]	0.071[a]	0.064[a]
HSHARE	−0.250[a]	−0.129[a]	0.184[a]	0.004	−0.025[b]	−0.296[a]	0.081[a]	0.087[a]
BSHARE	−0.085[a]	−0.178[a]	0.048[a]	0.036[b]	−0.019	−0.207[a]	0.020	0.010
BIG4	−0.409[a]	−0.149[a]	−0.038[a]	0.118[a]	−0.021[c]	−0.458[a]	0.029[b]	0.047[a]
LOCAL	1	0.138[a]	0.098[a]	−0.104[a]	0.047[a]	0.375[a]	−0.033[b]	−0.070[a]
BIG4		−0.149[a]	−0.038[a]	0.118[a]	−0.021[c]	−0.458[a]	0.029[b]	0.047[a]
VOL		1	−0.206[a]	−0.040[a]	0.001	0.069[a]	−0.135[a]	−0.236[a]
SIZE			1	−0.235[a]	0.027[b]	−0.180[a]	0.041[a]	0.106[a]
LEV				1	0.076[a]	−0.061[a]	−0.051[a]	−0.046[a]
STDROA					1	0.041[a]	−0.119[a]	−0.119[a]
M/B						1	−0.015	−0.025[b]
INDN							1	0.953[a]

of liberalization in the Chinese stock market during our sample period, 1996–2003. About 4% of the A-share firms simultaneously issued H-shares, while 12.3% simultaneously issued B-shares. This reflects the fact that the "overseas" listing of H-shares in Hong Kong is more difficult and regulated than the listing of dual-class shares on the B-share markets.[17] The data for the two audit quality measures indicate that joint ventures of Big 4 firms audited fewer than 8% of our sample firms, and that nearly 70% of Chinese-listed firms are locally audited.

Table 3 presents the matrix of Pearson pair wise correlations between our major variables. The two synchronicity measures, *SYNCH*(1) and *SYNCH*(1*a*, *b*, *c*), are highly correlated with each other (r=0.971). Consistent with our expectations, both measures are positively correlated with largest-shareholder concentration (*TOPHOLD*) and largest-shareholder association with the government (*TOPGOV*), which is in line with H1a and H1b, respectively, while these measures are negatively correlated with the issuance of foreign shares (*FOREIGN*, *HSHARE*, *BSHARE*), which is consistent with H2a. Further, the correlation between each measure of synchronicity with *HSHARE* is even more negative than its correlation with *BSHARE*, which is in line with H2b. Finally, both *SYNCH*(1) and *SYNCH*(1*a*, *b*, *c*) are negatively correlated with *BIG4*, which is consistent with H3.

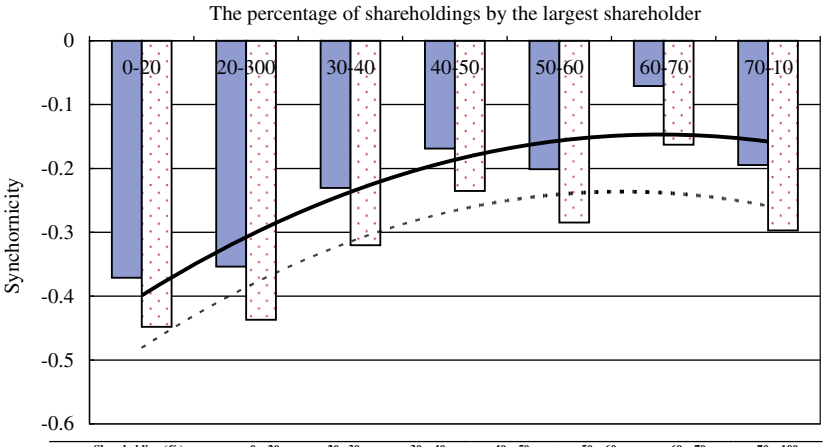
4.3. Concave relation between synchronicity and ownership concentration

To provide further insight into the association between ownership concentration and synchronicity, we compare the mean *SYNCH* on different levels of largest-shareholder concentration: below 20%, 20–30%, 30–40%, 40–50%, 50–60%, 60–70%, and over 70%. Fig. 1 depicts how synchronicity changes with concentration. The information provided at the second row from the bottom of Fig. 1 reveals that, on average, the largest shareholder holds more than 50% of total share capital for 37.14% (17.56%+12.70%+6.88%) of our sample firms, and holds over 20% of the capital for over 90% of such firms. The bar charts in Fig. 1 show that synchronicity increases as concentration increases, up to around 40–50%. Beyond 50%, however, the increasing trend in *SYNCH* tapers off and begins to decrease. Put otherwise, synchronicity appears to be a concave function of ownership concentration, as hypothesized in H1a.

5. Results of multivariate regressions

Columns 1(a, b), 2, and 3 of Table 4 report regression results for Eqs. (2)–(4), respectively. Reported t-values are

[17] Hong Kong is a Special Administrative Region of the People's Republic of China (PRC). The word overseas is used here to indicate the significant differences between the PRC mainland stock market and the Hong Kong stock market.



Shareholding (%)	0 ~ 20	20 ~30	30 ~ 40	40 ~ 50	50 ~ 60	60 ~ 70	70 ~ 100
SYNCH(1)	-0.371	-0.354	-0.230	-0.169	-0.201	-0.071	-0.195
SYNCH(1a,b,c)	-0.448	-0.437	-0.320	-0.235	-0.285	-0.163	-0.297
Number of observations (%)	515 (8.42)	1,369 (22.37)	995 (16.26)	968 (15.81)	1,075 (17.56)	777 (12.70)	421 (6.88)
Cumulative N (Cumulative %)	515 (8.42)	1,884 (30.79)	2,879 (47.05)	3,847 (62.86)	4,922 (80.42)	5,699 (93.12)	6,120 (100)

Fig. 1. The relation between stock price synchronicity and the percentage of shareholdings by the largest shareholder The shaded bar and the solid curve represent *SYNCH*(1), while the dotted bar and the dotted curve represent *SYNCH*(1*a*, *b*, *c*).

on an adjusted basis using robust standard errors corrected for firm-level clustering, addressing potential biases that may arise from serial dependency in the data.[18] As seen in column 1a, the coefficient on $TOPHOLD^2$ is significantly negative (-0.782, $t=-2.12$) and the coefficient on *TOPHOLD* is significantly positive (0.899, $t=2.61$). This indicates that synchronicity is a concave function of ownership concentration, which is consistent with H1a.

One may argue, however, that a better concentration measure would be the disparity between the largest shareholder's position and those of other substantial investors, as the largest shareholder is more likely to become entrenched as the disparity increases. We therefore consider, as an alternative measure, the *difference* in percentage shareholding between the largest and the second- and third-largest shareholders, denoted by *DIF*:

$$DIF_{i,t} = TOPHOLD_{i,t} - HOLD2_{i,t} - HOLD3_{i,t},$$

where, for firm i and year t, *HOLD*2 and *HOLD*3 are percentages of shares held by the second- and the third-largest shareholders, respectively.

Eq. (2) is estimated anew after replacing $TOPHOLD^2$ and *TOPHOLD* by DIF^2 and *DIF*, respectively. The regression results, reported in column 1b, show that the new results are qualitatively equivalent to the previous results. For example, the coefficients on DIF^2 and *DIF* are -0.012 ($t=-2.12$) and 0.152 ($t=3.64$), respectively.[19]

As shown in Columns 1a and 1b, the coefficients on *TOPGOV* are significantly positive (0.110, $t=3.10$ and 0.111, $t=3.14$, respectively), consistent with H1b, and supportive of the notion that the government-related largest shareholder has fewer incentives to voluntarily disclose value-relevant, private information to outside shareholders than does the non-government-related largest shareholder. Thus, the amount of firm-specific information capitalized into stock prices tends to be lower when the largest shareholder is government related.

As shown in column 2, the estimated coefficients on *HSHARE* and *BSHARE* are highly significant, with the expected negative signs (-0.405, $t=-4.81$ and -0.239, $t=-5.43$, respectively). These results strongly support H2a, suggesting that foreign investors facilitate the capitalization of firm-specific information into stock prices, and thus reduce synchronicity. Further, the estimated coefficient on *HSHARE* is significantly smaller than that on *BSHARE* ($-0.405 < -0.239 < 0$). The partial *F*-test for the equality of the two coefficients is $F=18.70$ ($p < 0.001$). This strongly supports H2b: firms issuing A+H shares capitalize more firm-specific information into their stock prices than do firms issuing A+B shares, ceteris paribus. These results also suggest that while firm-level governance mechanisms, including ownership structure, have an impact on synchronicity, institution-level investor protection also facilitates the flow of firm-specific information to outside investors. The regression results reported in column 2 thus align with both H2a and H2b.

In column 3, the *BIG*4 coefficient is significantly negative (-0.117, $t=-3.50$). This supports H3 in that Big 4 auditors are better able to convey more credible, firm-specific information to investors, and thus, facilitate firm-specific information being capitalized, compared with other auditors. The coefficient on *LOCAL* is significantly positive (0.111, $t=3.45$), which suggests that local auditors are less effective than non-local auditors in facilitating firm-specific information capitalization, consistent with Gul, Kim, and Qiu (2007), who show local auditors to be less effective in deterring biased financial reporting or opportunistic earnings management.

Column 4 presents the estimated results for the full-model regression with all test variables included. All estimated coefficients remain significant at less than the 5% level with expected signs, while the estimated

[18] See Petersen (2009) for a detailed discussion about the use of clustered standard errors as a means to correct for residual serial correlation in financial panel data.

[19] Though not reported, similar results are obtained when *DIF* is redefined to relate to the second- through fifth-largest shareholders.

Table 4
The effect of ownership concentration, shareholding by foreign investors, and audit quality on stock price synchronicity.

All variables are as defined in the Appendix. The dependent variable is *SYNCH*(1), and is estimated using Eq. (1). Numbers in parentheses represent *t*-values that are adjusted using standard errors corrected for clustering at the firm level. The superscripts a, b, and c denote the 1%, 5%, and 10% levels of significance, respectively.

	(1a) H1a:$\gamma_1<0$ & $\gamma_2>0$ H1b:$\gamma_3>0$	(1b) H1a:$\gamma_1<0$ & $\gamma_2>0$ H1b:$\gamma_3>0$ (*TOPHOLD*=*DIF*)	(2) H2a:ϕ_1, $\phi_2<0$ H2b:$\phi_1<\phi_2<0$	(3) H3: $\lambda_1<0$	(4) Full-model regression
Panel A: *Test variables*					
$TOPHOLD^2$	−0.782	−0.012			−0.953
	(−2.12)[b]	(−2.12)[b]			(−2.52)[b]
TOPHOLD	0.899	0.152			0.981
	(2.61)[a]	(3.64)[a]			(2.80)[a]
TOPGOV	0.110	0.111			0.109
	(3.10)[a]	(3.14)[a]			(3.10)[a]
HSHARE			−0.405		−0.369
			(−4.81)[a]		(−4.22)[a]
BSHARE			−0.239		−0.215
			(−5.43)[a]		(−4.61)[a]
BIG4				−0.117	−0.059
				(−3.50)[a]	(−1.76)[c]
Panel B: *Control variables*					
LOCAL				0.111	0.082
				(3.45)[a]	(2.53)[b]
VOL	−0.076	−0.080	−0.117	−0.093	−0.111
	(−7.00)[a]	(−7.59)[a]	(−10.63)[a]	(−8.93)[a]	(−8.89)[a]
SIZE	0.074	0.069	0.091	0.065	0.075
	(4.53)[a]	(4.21)[a]	(5.69)[a]	(3.89)[a]	(4.44)[a]
LEV	0.001	0.001	0.003	0.003	0.003
	(0.43)	(0.32)	(1.19)	(1.06)	(1.32)
STDROA	−0.005	−0.006	−0.009	−0.004	−0.009
	(−0.47)	(−0.54)	(−0.73)	(−0.34)	(−0.81)
M/B	−0.030	−0.030	−0.045	−0.046	−0.050
	(−3.98)[a]	(−3.98)[a]	(−5.70)[a]	(−5.15)[a]	(−5.76)[a]
INDNUM	0.011	−0.004	−0.016	0.003	−0.041
	(0.09)	(−0.04)	(−0.13)	(0.02)	(−0.34)
INDSIZE	0.028	0.022	0.027	0.033	0.034
	(0.69)	(0.54)	(0.64)	(0.81)	(0.82)
Constant	−2.891	−2.404	−2.873	−2.680	−2.793
	(−3.02)[a]	(−2.47)[b]	(−2.95)[a]	(−2.78)[a]	(−2.89)[a]
Industry dummies	Included	Included	Included	Included	Included
Year dummies	Included	Included	Included	Included	Included
N	6,120	6,088	6,120	6,120	6,120
Adj. R^2	34.61%	34.67%	35.15%	34.45%	35.95%

coefficient on *BIG4* is significant at the 10% level with an expected negative sign.

We now turn to our control variables. The *VOL* coefficients are significantly negative ($p<0.00$) across all columns. This suggests that active trading enhances the incorporation of firm-specific information into stock prices. Consistent with the US finding of Piotroski and Roulstone (2004), the *SIZE* coefficients are significantly positive ($p<0.01$). This indicates that stock prices of large Chinese firms tend to mirror the market to a greater extent than do those of small firms: large firms constitute a major proportion of firms included in the market and industry indexes, and these firms are highly diversified, particularly in emerging markets such as China (Chan and Hameed, 2006). The *M/B* coefficients are significantly negative ($p<0.01$), which suggests that firms with high growth potential tend to have more firm-specific information incorporated into their stock prices. The remaining coefficient estimates are insignificant in all regressions.

Table 5 presents the regression results using *SYNCH*(*1a*, *b*, *c*) as the dependent variable. As shown in the table, the coefficient estimates are qualitatively identical to those reported in Table 4, which thus buttresses our previous inferences. As shown in column 4 of both tables, the coefficient on *BIG4* becomes larger (−0.095 versus −0.059) and more significant ($t=-2.81$ versus −1.76) when *SYNCH*(1*a*, *b*, *c*) is used.

Fig. 1 graphically illustrates that synchronicity reaches its peak at around 50% ownership by the largest shareholder. Note in Eq. (2) that the synchronicity-maximizing level of largest-shareholder ownership, say $TOPHOLD^*$, occurs where $\partial SYNCH/\partial TOPHOLD=2\gamma_1 TOPHOLD+\gamma_2=0$, or $TOPHOLD^*=-\gamma_2/2\gamma_1$. Using the estimated coefficients on $TOPHOLD^2$ and *TOPHOLD* (i.e., γ_1 and γ_2, respectively) for the full-model regressions in Tables 4 and 5, we find $TOPHOLD^*$ to be about 0.51 and 0.54, respectively. In short, on average, synchronicity reaches the peak in the neighborhood of 50% with all other factors being

Table 5
The effect of ownership concentration, shareholding by foreign investors, and audit quality on an alternative measure of stock price synchronicity.

All variables are as defined in the Appendix. The dependent variable is *SYNCH*(1*a*,*b*,*c*), and is estimated using Eqs. (1a), (1b), and (1c) for firms with A-shares only, firms with A- and B-shares, and firms with A- and H-shares, respectively. Numbers in parentheses represent *t*-values that are adjusted using standard errors corrected for clustering at the firm level. The superscripts a and b denote the 1% and 5% levels of significance, respectively.

	(1a) H1a:$\gamma_1<0$& $\gamma_2>0$ H1b:$\gamma_3>0$	(1b) H1a:$\gamma_1<0$ &$\gamma_2>0$ H1b:$\gamma_3>0$ (*TOPHOLD=DIF*)	(2) H2a:ϕ_1, $\phi_2<0$ H2b:$\phi_1<\phi_2<0$	(3) H3: $\lambda_1<0$	(4) Full-model regression
Panel A: Test variables					
TOPHOLD^2	−0.845	−0.011			−1.022
	(−2.23)[b]	(−2.02)[b]			(−2.66)[a]
TOPHOLD	0.916	0.148			1.013
	(2.60)[a]	(3.47)[a]			(2.85)[a]
TOPGOV	0.108	0.107			0.106
	(2.98)[a]	(2.93)[a]			(2.94)[a]
HSHARE			−0.444		−0.396
			(−5.19)[a]		(−4.48)[a]
BSHARE			−0.211		−0.186
			(−4.94)[a]		(−4.12)[a]
BIG4				−0.155	−0.095
				(−4.49)[a]	(−2.81)[a]
Panel B: Control variables					
LOCAL				0.125	0.094
				(3.67)[a]	(2.75)[a]
VOL	−0.076	−0.080	−0.115	−0.094	−0.110
	(−7.01)[a]	(−7.51)[a]	(−10.32)[a]	(−9.04)[a]	(−8.74)[a]
SIZE	0.058	0.052	0.074	0.044	0.056
	(3.26)[a]	(2.93)[a]	(4.35)[a]	(2.46)[b]	(3.11)[a]
LEV	0.001	−0.001	0.001	0.001	0.002
	(0.01)	(−0.08)	(0.53)	(0.51)	(0.72)
STDROA	−0.002	−0.003	−0.005	−0.001	−0.005
	(−0.20)	(−0.33)	(−0.52)	(−0.11)	(−0.56)
M/B	−0.034	−0.034	−0.049	−0.052	−0.057
	(−4.51)[a]	(−4.51)[a]	(−6.24)[a]	(−5.95)[a]	(−6.50)[a]
INDNUM	−0.045	−0.062	−0.070	−0.057	−0.097
	(−0.37)	(−0.51)	(−0.59)	(−0.47)	(−0.80)
INDSIZE	0.025	0.021	0.024	0.031	−0.032
	(0.64)	(0.53)	(0.61)	(0.81)	(−0.82)
Constant	−2.297	−1.833	−2.290	−2.012	2.190
	(−2.49)[b]	(−1.96)[b]	(−2.47)[b]	(−2.20)[b]	(2.37)[b]
Industry dummies	Included	Included	Included	Included	Included
Year dummies	Included	Included	Included	Included	Included
N	6,120	6,088	6,120	6,120	5,994
Adj. R^2	35.56%	35.63%	36.11%	35.64%	36.91%

accounted for. This finding is consistent with the notion that ownership concentration beyond about 50% leads to the managerial entrenchment effect being dominated by the incentive alignment effect in China.

6. Robustness checks

6.1. Endogeneity

Thus far, we have not considered any potential self-selection bias that might arise from the fact that firms self-select their auditors. One cannot rule out the possibility, however, that low-synchronicity firms are more likely to choose Big 4 auditors. In such a case, examining the effect of Big 4 versus non-Big 4 auditor choice in a single-equation context may introduce a self-selection bias into our estimate of the Big 4 coefficient. We address this issue using a two-stage regression approach.

In the first stage, we estimate a probit regression in which the likelihood of Big 4 auditor choice, denoted by *Pr*(*BIG*4), is regressed on a set of firm-specific variables that might influence the demand for high-quality auditors:

$$Pr(BIG4)_{i,t} = \delta_0 + \delta_1 LEV_{i,t} + \delta_2 M/B_{i,t} + \delta_3 SALES_{i,t} + \delta_4 SHRINC_{i,t} + \delta_5 LOSS_{i,t} + (YearDummies) + (IndustryDummies) + \varepsilon, \quad (5)$$

where, for firm *i* and year *t*, *Pr*(*Big*4) is ex post coded as one for *Big* 4 clients, and zero otherwise; *SALES* denotes the dollar amount of sales; *SHRINC* equals one if the number of shares outstanding increases more than 10% in each sample year, and zero otherwise; *LOSS* equals one for loss firms, and zero otherwise; and *LEV*, *M*/*B*, and ε are as defined earlier.

We include *SALES* and *LEV* because prior research shows that the demand for high-quality auditors is greater for large firms and firms that rely heavily on debt financing (e.g., Choi and Wong, 2007). We also include *M*/*B* because the demand for high-quality auditors may systematically differ between high- and low-growth firms. Similarly, *SHRINC* is included because firms involved in significant share-increasing transactions are more likely to appoint Big 4 auditors (e.g., Kim, Chung, and Firth, 2003). Finally, we include the *LOSS* dummy because loss firms are less likely to hire Big 4 auditors than profit firms (e.g., Francis, Maydew, and Sparks, 1999; Kim, Chung, and Firth, 2003). Year and industry dummies are included to control for year and industry fixed effects.

In the second stage, we estimate our main regressions in two different ways to deal with potential self-selection biases. First, we follow the Heckman (1979) two-stage treatment effect procedure. Specifically, we compute the inverse Mills ratio, denoted by *Lamda*, from the first-stage probit estimate of Eq. (5), and then include *Lamda* in the second-stage regressions. Second, we estimate our main regressions with the fitted value of *Pr*(*BIG*4), denoted by *PredBIG*4, from the first-stage probit regression as an instrument for the indicator variable, *BIG*4, in the second-stage regression.

Section A of Table 6 presents first-stage probit estimates. The results show that the likelihood of Big 4 auditor choice is positively related to leverage and sales, and is insignificantly associated with firm involvement in share-increasing transactions, while it has a significantly negative relation with growth potential and the loss dummy.

Section B reports second-stage results with the inverse Mills ratio included, while Section C presents those with *PredBIG*4 in lieu of *BIG*4. Both sections involve the two different synchronicity measures. As shown in both sections, corrections for self-selection bias do not alter the earlier results. Consistent with H3, the coefficients on *BIG*4 and *PredBIG*4 are significantly negative, at varying levels of statistical significance. In short, the above results indicate that the inverse relation between synchronicity and Big 4 auditor choice shown in Tables 4 and 5 is robust to potential endogeneity concerns.

6.2. Other sensitivity checks

Additional robustness checks consider whether our results are sensitive to the Asian financial crisis of 1997–1998, the presence of outliers, or the use of weekly instead of daily returns. For brevity, Table 7 reports the results of our robustness checks for the full-model regression with *SYNCH*(1) as the dependent variable, since the results using *SYNCH*(1*a*, *b*, *c*) are qualitatively similar to those using *SYNCH*(1). Regressions in columns 1a and 1b are estimated after excluding 1997–1998 observations in order to see if our earlier results are unduly influenced by the Asian financial crisis. We find that the new results in columns 1a and 1b are qualitatively similar to those reported in column 4 of Table 4, suggesting that our main regression results are unlikely to be driven by any exogenous shocks caused by the crisis. The results shown in columns 2a and 2b are obtained after winsorizing all variables at the bottom and top 1% points of their empirical distributions. The winsorization does not alter our statistical inferences, suggesting that our results are robust to potential outlier problems.[20]

Finally, we estimate synchronicity using weekly returns in lieu of daily returns to alleviate concerns about potential problems of infrequent or non-synchronous trading that may arise from the use of daily return data for estimating the market model.[21] As shown in Section C, the regression results with weekly return data are qualitatively identical with those with daily return data, suggesting that our regression results are robust to alternative return measurement intervals.[22] In short, the results of our robustness checks lend further support for our hypotheses.

7. Stock price synchronicity and earnings informativeness

Ashbaugh-Skaife, Gassen, and LaFond (2005) cast doubt on the validity of stock price synchronicity as a measure of the extent to which firm-specific information is incorporated into stock prices in international markets. As a validity check, we perform an additional test to see if our synchronicity measure captures the amount of firm-specific information impounded into Chinese stock prices. If it does, we expect the return–earnings association to be weaker for firms with high synchronicity than for firms with low synchronicity, given that corporate earnings are considered the most important value-relevant, firm-specific information. The following model is specified to subject this expectation to an empirical test:

$$MAR_{it} = \alpha_0 + \alpha_1 NI_{it} + \alpha_2 NI_{it} * DR\_SYNCH_{it} + \sum_k \alpha_k NI_{it} * CONTROL^k_{it} + IndustryDummies + YearDummies + \varepsilon, \quad (6)$$

where, for firm i and year t, *MAR* is market-adjusted monthly returns compounded over the 12-month period ending the fourth month after the end of a firm's fiscal year[23]; *NI* is net income deflated by the market value of equity at the beginning of the fiscal year; *DR_SYNCH* is the scaled decile rank score; *CONTROL* denotes a set of control

[20] We obtain similar results when a 5% winsorization censoring point is used.

[21] In so doing, we require that weekly return data be available for at least 30 weeks in each sample year.

[22] We also obtain an additional measure of *SYNCH*. For this purpose, we estimate an alternative market-model specification in which lagged terms on the market return (*MKTRET*) and the world market return (*WRDRET*) are additionally included in Eqs. (1a)–(1c), and lagged B-share market return ($MKTRET^B$) and lagged Hong Kong market return ($MKTRET^H$) are additionally included in Eqs. (1b) and (1c), respectively. We then obtain the R^2-statistics, compute the associated *SYNCH* measure, and then repeat the analyses reported in Table 5. Though not reported for brevity, the results of regressions using this alternative *SYNCH* measure remain qualitatively similar to those reported in Table 5, suggesting that the regression results presented in Table 5 are robust to potential serial correlation problems associated with non-synchronous trading.

[23] Chinese-listed firms are required to make their financial statements publicly available by the end of the fourth month after the fiscal year-end.

Table 6
Results of two-stage regressions to examine self-selection bias associated with auditor choice.

All variables except *SALES*, *SHRINC*, and *LOSS* are as defined in the Appendix. *SALES* represents the dollar amount of sales. *SHRINC* is an indicator variable that equal one if the number of shares outstanding increases more than 10% in each sample year and zero otherwise. *LOSS* is an indicator variable that equals one for loss firms and zero otherwise. *SYNCH* (1) is estimated using Eq. (1). *SYNCH*(1*a*,*b*,*c*) is estimated using Eqs. (1a)–(1c) for firms with A-shares only, firms with A- and B-shares, and firms with A- and H-shares, respectively. Numbers in parentheses represent *t*-values that are adjusted using standard errors corrected for clustering at the firm level. The superscripts a, b, and c denote the 1%, 5%, and 10% levels of significance, respectively.

	Section A First-stage probit regression	Section B Heckman approach with inverse Mills ratio (*Lamda*) included				Section C Two-stage least square (2SLS) approach with the predicted likelihood of auditor choice			
	(1) Dependent variable =*Pr(BIG4)*	(2) Dependent variable =*SYNCH*(1)		(3) Dependent variable =*SYNCH*(1*a*,*b*,*c*)		(4) Dependent variable =*SYNCH*(1)		(5) Dependent variable =*SYNCH(1a,b,c)*	
Panel A									
TOPHOLD^2			−0.992 (−2.60)^a		−1.045 (−2.71)^a		−0.738 (−2.00)^b		−0.765 (−2.04)^b
TOPHOLD			1.012 (2.86)^a		1.031 (2.87)^a		0.828 (2.44)^b		0.827 (2.40)^b
TOPGOV			0.111 (3.14)^a		0.106 (2.94)^a		0.093 (2.70)^a		0.085 (2.46)^b
HSHARE			−0.384 (−4.42)^a		−0.409 (−4.64)^a		−0.263 (−3.19)^a		−0.277 (−3.33)^a
BSHARE			−0.216 (−4.70)^a		−0.187 (−4.18)^a		−0.173 (−3.82)^a		−0.141 (−3.20)^a
BIG4		−0.113 (−3.31)^a	−0.057 (−1.72)^c	−0.144 (−4.03)^a	−0.088 (−2.55)^b				
PredBIG4						−1.595 (−8.83)^a	−1.412 (−7.59)^a	−1.774 (−9.91)^a	−1.593 (−8.60)^a
				Panel B					
LOCAL		0.111 (3.38)^a	0.083 (2.49)^b	0.123 (3.52)^a	0.093 (2.65)^a	0.051 (1.56)	0.035 (1.07)	0.059 (1.71)^c	0.042 (1.22)
VOL		−0.093 (−8.98)^a	−0.110 (−8.78)^a	−0.094 (−9.12)^a	−0.110 (−8.70)^a	−0.112 (−10.15)^a	−0.121 (−9.43)^a	−0.114 (−10.36)^a	−0.122 (−9.40)^a
SIZE		0.064 (3.82)^a	0.075 (4.44)^a	0.043 (2.42)^b	0.057 (3.13)^a	0.033 (2.10)^b	0.041 (2.48)^b	0.009 (0.56)	0.019 (1.08)
LEV	0.007 (8.05)^a	0.002 (0.67)	0.002 (0.88)	0.001 (0.26)	0.001 (0.39)	0.007 (1.85)^c	0.007 (1.96)^c	0.007 (1.43)	0.006 (1.47)
STDROA		−0.004 (−0.29)	−0.008 (−0.70)	−0.001 (−0.08)	−0.005 (−0.45)	0.001 (0.04)	−0.004 (−0.29)	0.004 (0.29)	0.001 (0.01)
M/B	−0.004 (−37.11)^a	−0.052 (−4.96)^a	−0.059 (−5.93)^a	−0.058 (−5.53)^a	−0.065 (−6.50)^a	−0.117 (−9.65)^a	−0.115 (−9.57)^a	−0.130 (−10.71)^a	−0.127 (−10.64)^a
INDNUM		0.011 (0.09)	−0.033 (−0.27)	−0.054 (−0.45)	−0.094 (−0.78)	−0.003 (−0.02)	−0.036 (−0.30)	−0.069 (−0.58)	−0.098 (−0.81)
INDSIZE		0.025 (0.59)	0.026 (0.60)	0.024 (0.61)	0.025 (0.63)	0.031 (0.73)	0.031 (0.73)	0.031 (0.80)	0.031 (0.79)
SALES	0.001 (4.53)^a								
SHRINC	*−0.011* (−1.52)								
Lamda		−0.007 (−1.33)	−0.008 (−1.53)	−0.009 (−1.55)	−0.009 (−1.69)^c				
LOSS	−0.054 (−6.93)^a								
Constant	0.131 (11.30)^a	−2.492 (−2.55)^b	−2.635 (−2.68)^a	−1.850 (−2.00)^b	−2.053 (−2.19)^b	−1.684 (−1.73)^c	−1.808 (−1.84)^c	−0.963 (−1.05)	−1.140 (−1.22)
Industry dummies	Included	Included	Included	Included	Included	Included	Included	Included	Included
Year dummies	Included	Included	Included	Included	Included	Included	Included	Included	Included
N	5,994	5,994	5,994	5,994	5,994	5,994	5,994	5,994	5,994
Adj. R^2 (pseudo R^2)	(23.72%)	34.87%	36.43%	36.09%	37.40%	36.98%	38.02%	38.43%	39.22%

variables, i.e., firm size, measured by the natural log of market capitalization (*MCAP*), market-to-book ratio (*M*/*B*), and leverage (*LEV*). We include these three control variables, because numerous studies on the return-earnings association find that the strength of the association, measured by the magnitude of the earnings-response coefficient, is positively (negatively) associated with firm size and growth potential (financial leverage).[24] Industry and year dummies are included to control for industry and year fixed effects.

[24] See Kothari (2001) and references therein for more detailed discussion on the issue.

Table 7
The results of other robustness checks.

All variables are as defined in the Appendix A. The dependent variable is *SYNCH*(1), and is estimated using Eq. (1). Numbers in parentheses represent *t*-values that are adjusted using standard errors corrected for clustering at the firm level. The superscripts a, b, and c denote the 1%, 5%, and 10% levels of significance, respectively.

	Section A Excluding 1997 & 1998 observations		Section B Winsorising top & bottom 1%		Section C Use of weekly returns	
	(1a)	(1b)	(2a)	(2b)	(3a)	(3b)
Panel A: Test variables						
TOPHOLD^2	−1.106	−1.141	−1.349	−1.212	−1.348	−1.405
	(−2.65)^a	(−2.72)^a	(−2.82)^a	(−2.73)^a	(−2.78)^a	(−2.87)^a
TOPHOLD	1.177	1.207	1.261	1.074	1.137	1.184
	(3.01)^a	(3.07)^a	(2.91)^a	(2.67)^a	(2.58)^b	(2.67)^a
TOPGOV	0.121	0.123	0.085	0.084	0.110	0.117
	(3.05)^a	(3.07)^a	(2.77)^a	(2.77)^a	(2.53)^b	(2.67)^a
HSHARE	−0.388	−0.408	−0.391	−0.404	−0.246	−0.267
	(−3.94)^a	(−4.14)^a	(−4.61)^a	(−4.79)^a	(−2.43)^b	(−2.63)^a
BSHARE	−0.229	−0.230	−0.210	−0.181	−0.196	−0.199
	(−4.45)^a	(−4.52)^a	(−5.01)^a	(−4.53)^a	(−3.77)^a	(−3.89)^a
BIG4	−0.071	−0.071	−0.097	−0.099	−0.083	−0.078
	(−1.90)^c	(−1.91)^c	(−3.99)^a	(−4.11)^a	(−2.09)^b	(−1.93)^c
Panel B: Control variables						
LOCAL	0.085	0.087	0.102	0.099	0.100	0.097
	(2.41)^b	(2.42)^b	(3.60)^a	(3.49)^a	(2.43)^b	(2.31)^b
VOL	−0.123	−0.122	−0.180	−0.185	−0.128	−0.127
	(−8.64)^a	(−8.53)^a	(−11.89)^a	(−12.39)^a	(−8.51)^a	(−8.39)^a
SIZE	0.072	0.072	0.028	0.005	−0.004	−0.002
	(3.89)^a	(3.87)^a	(1.72)^c	(0.33)	(−0.16)	(−0.11)
LEV	0.003	0.002	−0.359	−0.367	0.002	0.002
	(1.35)	(0.91)	(−7.33)^a	(−7.43)^a	(1.02)	(0.72)
STDROA	−0.013	−0.012	0.250	0.252	−0.007	−0.006
	(−0.96)	(−0.82)	(2.83)^a	(2.95)^a	(−0.60)	(−0.44)
M/B	−0.053	−0.064	−0.101	−0.104	−0.050	−0.061
	(−5.48)^a	(−5.82)^a	(−10.32)^a	(−9.90)^a	(−4.60)^a	(−4.85)^a
INDNUM	−0.002	0.002	−0.240	−0.267	−0.101	−0.106
	(−0.12)	(0.01)	(−2.35)^b	(−2.67)^a	(−0.66)	(−0.68)
INDSIZE	−0.005	−0.016	−0.021	0.001	0.073	0.067
	(−0.12)	(−0.36)	(−0.50)	(0.04)	(1.42)	(1.27)
Lamda		−0.010		−0.008		−0.012
		(−1.63)		(−1.73)^c		(−1.78)^c
Constant	−1.107	−0.891	0.872	0.841	−1.607	−1.494
	(−1.19)	(−0.93)^a	(0.87)	(0.89)	(−1.35)	(−1.23)
Industry dummies	Included	Included	Included	Included	Included	Included
Year dummies	Included	Included	Included	Included	Included	Included
N	5,241	5,120	6,120	5,994	6,080	5,955
Adj. R^2	34.90%	35.36%	40.38%	43.38%	20.99%	21.45%

To alleviate concerns over the possibility that the regression results for Eq. (6) are unduly influenced by a small number of outlying *SYNCH* observations and/or that *SYNCH* is measured with error, we use *DR_SYNCH* instead of *SYNCH*. To obtain *DR_SYNCH*, we classify *SYNCH* into deciles based on its ranked values in each sample year, with zero representing the smallest decile and nine representing the largest. We then scale the decile ranks (by dividing nine) to range between zero and one.

Columns 1 and 2 of Table 8 present estimates of Eq. (6) using scaled decile ranks of *SYNCH*(1) and *SYNCH*(1*a*, *b*, *c*), respectively.[25] The *NI* coefficients are significantly positive for both measures, reflecting that earnings are significantly associated with stock returns. Moreover, the *NI***DR_SYNCH* coefficient is significantly negative in both columns, which implies that the market attaches a lower value to earnings of high-synchronicity firms, and that corporate earnings information is capitalized into stock prices to a lesser extent for these firms. The above findings are consistent with the view that our measure of synchronicity captures the amount of firm-specific information incorporated into Chinese stock prices.

Finally, we observe significantly positive coefficients on *NI***MCAP*, and *NI***M/B*, and an insignificantly negative coefficient on *NI***LEV*. This suggests that the strength of the return-earnings association, captured by the earnings-response coefficient, is greater for large firms and high-growth firms, which is generally consistent with US findings.[26]

[25] The use of lagged price as an earnings deflator and the return-measurement interval for a year ending the fourth month after a firm's fiscal year reduce firm-year observations from *N*=6,120 to 4,654.

[26] See Kothari (2001) for an extensive review of the return-earnings association literature.

Table 8
The effect of stock price synchronicity on return-earnings associations.

All variables are as defined in the Appendix. *DR_SYNCH*(1) and *DR_SYNCH*(1*a*, *b*, *c*) are the scaled decile rank scores of *SYNCH*(1) and *SYNCH*(1*a*, *b*, *c*), respectively, which range from zero to one. *SYNCH*(1) is the stock price synchronicity measure, which is estimated using Eq. (1), while *SYNCH*(1*a*, *b*, *c*) is the stock price synchronicity measure, which is estimated using Eqs. (1a), (1b), and (1c) for firms with A-shares only, firms with A- and B-shares, and firms with A- and H-shares, respectively. Numbers in parentheses represent *t*-values that are adjusted using standard errors corrected for clustering at the firm level. The superscript a denotes the 1% level of significance, respectively.

	(1) Using *DR_SYNCH*(1)	(2) Using *DR_SYNCH*(1*a*, *b*, *c*)
NI	2.894	2.984
	(4.83)[a]	(4.78)[a]
*NI*DR_SYNCH*	−0.271	−0.340
	(−3.22)[a]	(−3.72)[a]
*NI*MCAP*	0.127	0.130
	(5.00)[a]	(4.99)[a]
*NI*LEV*	−0.012	−0.015
	(−0.46)	(−0.55)
*NI*M/B*	0.086	0.086
	(3.71)[a]	(3.49)[a]
CONSTANT	−0.046	−0.046
	(−1.53)	(−1.54)
Year dummies	Included	Included
Industry dummies	Included	Included
Adj. R^2	5.11%	5.26%
N	4,654	4,654
F	10.85 ($p<0.0001$)	11.19 ($p<0.0001$)

8. Summary and concluding remarks

We investigate whether and how stock price synchronicity is associated with firm-level and institutional-level corporate governance characteristics unique to China. The firm-level governance variables we examine include ownership concentration for the largest shareholder, whether that shareholder is government related, foreign-investor ownership, and the quality of external auditors. The institution-level governance characteristic we examine is disparity in investor protection between the Hong Kong market and the domestic Shanghai and Shenzhen markets. We show five main findings.

First, we find a concave relation between synchronicity and ownership concentration: as concentration increases, synchronicity increases at a decreasing rate up to its maximum threshold, after which it begins to decrease. Second, synchronicity is higher when the largest shareholder is government related. Third, foreign-investor ownership enhances capitalization of firm-specific information into stock prices, thereby mitigating synchronicity. Fourth, synchronicity is significantly lower for A-share firms with H-shares traded on the Hong Kong market than for A-share firms with B-shares traded on the Shanghai or Shenzhen markets, suggesting that the efficacy of institution-level governance mechanisms affects the extent to which firm-specific information is capitalized into stock prices. Finally, the appointment of international Big 4 auditors is associated with lower synchronicity, suggesting that they play an important role in disseminating reliable, firm-specific information to the market by lending credibility to a firm's financial reports. Our results support the view that strong firm-level corporate governance enhances the information environment in emerging markets where country-level investor protection is relatively poor.

Our evidence provides policy implications to stock market regulators in transitional economies. An important policy objective in emerging markets is the efficient allocation of scarce capital. This objective could be better achieved when stock prices closely track firm fundamentals by reflecting all available, firm-specific information in an accurate and timely manner. In order to achieve the informational and functional efficiency of capital markets, improving firm-level governance is as important as improving country-level governance. In particular, our results suggest that the capitalization of firm-specific information into stock prices in emerging markets could be facilitated by reducing ownership concentration in general, and state ownership in particular, encouraging foreign-investor participation, improving audit quality, and strengthening institution-level investor protection. We look forward to, and confidently anticipate, seeing our results confirmed for other emerging markets in East Asia and beyond.

Appendix A. Variable definitions

R^2	The R^2 of the market model in Eq. (1) or the R^2 of the market models in Eqs. (1a)–(1c) for firms with A-shares only, firms with A+B shares, and firms with A+H shares, respectively
SYNCH(1)	Logarithmic transformation of R^2 for the market model in Eq. (1), computed as $\log [R^2/(1-R^2)]$
SYNCH(1*a*, *b*, *c*)	Logarithmic transformation of R^2 for the market model in Eqs. (1a)–(1c), computed as $\log [R^2/(1-R^2)]$
TOPHOLD	The percentage of shares held by the largest shareholder at beginning of year
STATE	The percentage of shares held by state owner(s) at beginning of year
TOPGOV	An indicator variable on the nature of the largest shareholder. It equals one if the firm's largest shareholder is government related, and zero if the firm's largest shareholder is non-government related
FOREIGN	The percentage of shares held by the foreign investors (B-share and/or H-share holders)
BSHARE	An indicator variable which equals one if a firm issues both A- and B-shares at the same time, and zero otherwise
HSHARE	An indicator variable which equals one if a firm issues both A- and H-shares at the same time, and zero otherwise
BIG4	An indicator variable for auditor quality. It equals one if a firm is audited by one of the joint ventures of international Big 4 audit firms and domestic audit firms, and zero otherwise
PredBIG4	Predicted value of the probability of Big 4 auditor choice using Eq. (5).
LOCAL	An indicator variable for auditor location. It equals one if a non-Big 4 auditor is located in the same administrative region of the local government where its client firm is headquartered, and zero otherwise. The joint ventures of Big 4 audit firms and domestic audit firms are all defined as non-local auditors in the current study.
VOL	Trading volume computed as the total number of shares traded in a year, divided by the total number of shares outstanding at the end of the fiscal year
SIZE	Firm size computed as the log of total assets at the end of the fiscal year

LEV	Leverage computed as total liabilities divided by total assets
STDROA	Volatility of a firm's earnings stream measured by the standard deviation of a firm's return on assets (ROA)s over the preceding five-year period, including the current year
M/B	Market-to-book ratio, computed as the total market value of equity, divided by the total net assets at the end of the fiscal year
INDNUM	Natural log of the number of firms in the industry to which a firm belongs
INDSIZE	Industry size measured as the log of year-end total assets of all sample firms in the industry to which a firm belongs
MAR	12-month market-adjusted monthly return for the 12-month period ending at the fourth month after a firm's fiscal year-end. Market-adjusted return refers to the difference between the actual return and market return in each month.
NI	Net income divided by the market value of equity at beginning of year
MCAP	Market capitalization measured by the natural log of total market value of equity at the end of the fiscal year
DIF	Difference in shareholding percentage between the largest shareholder and the second- and the third-largest shareholders

References

Allen, F., Qian, J., Qian, M., 2005. Law, finance and economic growth in China. Journal of Financial Economics 77, 57–116.

Ashbaugh-Skaife, H., Gassen, J., LaFond, R., 2005. Does stock price synchronicity represent firm-specific information? The international evidence. MIT Sloan, Unpublished working paper.

Ball, R., 2001. Infrastructure requirements for an economically efficient system of public financial reporting and disclosure. Brookings Papers on Financial Services 2001, 127–182.

Becker, C., DeFond, M., Jiambalvo, J., Subramanyam, K.R., 1998. The effect of audit quality on earnings management. Contemporary Accounting Research 15, 1–24.

Bertland, M., Mehta, P., Mullainathan, S., 2002. Ferreting out tunneling: an implication to Indian business groups. Quarterly Journal of Economics 117, 121–148.

Brockman, P., Chung, D., 2003. Investor protection and firm liquidity. Journal of Finance 58, 921–937.

Bushman, R., Piotroski, J., Smith, A., 2004. What determines corporate transparency?. Journal of Accounting Research 42, 207–252.

Chan, K., Hameed, A., 2006. Stock price synchronicity and analyst coverage in emerging markets. Journal of Financial Economics 80, 115–147.

Chan, K.H., Lin, K.Z., Mo, P.L., 2006. A political economic analysis of auditor reporting and auditor switches. Review of Accounting Studies 11, 21–48.

Chen, G.M., Firth, M., Kim, J.B., 2002. The use of accounting information for the valuation of dual-class shares listed on China's capital markets. Accounting and Business Research 32, 123–131.

Choi, J.H., Wong, T.J., 2007. Auditors' governance functions and legal environments: an international approach. Contemporary Accounting Research 24, 13–46.

Choi, J.H., Kim, J.B., Liu, X., Simunic, D., 2008. Audit pricing, legal liability regimes, and Big 4 premiums: theory and cross-country evidence. Contemporary Accounting Research 25, 55–99.

Chui, A.C.W., Kwok, C.Y., 1998. Cross-autocorrelation between A-shares and B-shares in the Chinese stock market. Journal of Financial Research 21, 333–353.

Claessens, S., Djankov, S., Fan, J., Lang, L., 2002. Disentangling the incentive and entrenchment effects of large shareholdings. Journal of Finance 57, 2741–2771.

Cremers, K.J.M., Nair, V., 2005. Governance mechanisms and equity prices. Journal of Finance 25, 2859–2894.

DeAngelo, L.E., 1981. Auditor size and audit quality. Journal of Accounting and Economics 3, 183–199.

DeFond, M., Wong, T.J., Li, S., 2000. The impact of improved auditor independence on audit market concentration in China. Journal of Accounting and Economics 28, 269–305.

DeFond, M., 1992. The association between changes in client firm agency costs and auditor switching. Auditing: A Journal of Practice and Theory 11, 16–31.

Dopuch, N., Simunic, D., 1982. The competition in auditing an assessment. In: Fourth Symposium on Auditing Research, Urbana University of Illinois, pp. 401–450.

Fan, J., Wong, T.J., 2002. Corporate ownership structure and the informativeness of accounting earnings in East Asia. Journal of Accounting and Economics 33, 401–425.

Fan, J., Wong, T.J., 2005. Do external auditors perform a corporate governance role in emerging markets? Evidence from East Asia. Journal of Accounting Research 43, 35–72.

Fernandes, N., Ferreira, M.A., 2008. Does international cross-listing improve the information environment?. Journal of Financial Economics 88, 216–244.

Fernandes, N., Ferreira, M.A., 2009. Insider trading laws and stock price informativeness. Review of Financial Studies 22, 1845–1887.

Ferreira, M.A., Laux, P.A., 2007. Corporate governance, idiosyncratic risk, and information flow. Journal of Finance 62, 951–989.

Francis, J.R., Maydew, E.L., Sparks, H.C., 1999. The role of Big 6 auditors in the credible reporting of accruals. Auditing: A Journal of Practice and Theory 18, 17–34.

French, K., Schwert, G.W., Stambaugh, R., 1987. Expected stock returns and volatility. Journal of Financial Economics 19, 3–30.

Gomes, A., 2000. Going public without governance: managerial reputation effects. Journal of Finance 55, 615–646.

Gompers, P., Ishii, J., Metrick, A., 2003. Corporate governance and equity prices. Quarterly Journal of Economics 25, 107–155.

Grossman, S.J., Stiglitz, J.E., 1980. On the impossibility of informationally efficient markets. The American Economic Review 70, 393–408.

Grossman, S.J., Hart, O.D., 1980. Takeover bids, the free-rider problems and the theory of the corporation. The Bell Journal of Economics 11, 42–64.

Gul, F.A., Kim, J.B., Qiu, A., 2007. Political economy, client economic importance, and auditor independence: some evidence from Chinese non-Big 4 auditors. Hong Kong Polytechnic University, City University of Hong Kong and Citic Security, Beijing, China, Unpublished working paper.

Heckman, J.J., 1979. Sample selection bias as a specification error. Econometrica 47, 153–162.

Himmelberg, C., Hubbard, R.G., Palia, D., 1999. Understanding the determinants of managerial ownership and the link between ownership and performance. Journal of Financial Economics 53, 353–384.

Jiang, Li., Kim, J.B., 2004. Foreign equity ownership and information asymmetry: evidence from Japan. Journal of International Financial Management & Accounting 15, 185–211.

Jin, L., Myers, S., 2006. R^2 around the world: new theory and new tests. Journal of Finance 79, 257–292.

Johnson, S., La Porta, R., Lopez-De-Silanes, F., Shleifer, A., 2000. Tunneling. American Economic Review 90, 22–27.

Kang, J.K., Stulz, R., 1997. Why is there a home bias? An analysis of foreign portfolio equity ownership in Japan. Journal of Financial Economics 46, 3–28.

Kim, J.B., Chung, R., Firth, M., 2003. Auditor conservatism, asymmetric monitoring and earnings management. Contemporary Accounting Research 20, 325–359.

Kim, J.B., Shi, H., 2009. International financial reporting standards, analyst following, institutional infrastructure, and stock price synchronicity. City University of Hong Kong and Fudan University, Unpublished working paper.

Kim, J.B., Yi, C.H., 2006. Ownership structure, business group affiliation, listing status, and earnings management: evidence from Korea. Contemporary Accounting Research 23, 427–464.

Kim, J.B., Yi, C.H., 2009. Foreign versus domestic institutional investors: who contribute more to stock price informativeness? Korean evidence. City University of Hong Kong and The Hong Kong Polytechnic University, Unpublished working paper.

Klapper, L.F., Love, I., 2004. Corporate governance, investor protection and performance in emerging markets. Journal of Corporate Finance 10, 703–728.

Kothari, S.P., 2001. Capital market research in accounting. Journal of Accounting and Economics 31, 105–231.

La Porta, R., Lopez-de-Silanes, F., Shleifer, A., Vishny, R., 1998. Law and finance. Journal of Political Economy 106, 1113–1155.

La Porta, R., Lopez-de-Silanes, F., Shleifer, A., Vishny, R., 2000. Investor protection and corporate governance. Journal of Financial Economics 58, 3–27.

Li, K., Morck, R., Yang, F., Yeung, B., 2004. Firm-specific variation and openness in emerging markets. The Review of Economics and Statistics 86, 658–669.

Lins, K., 2003. Equity ownership and firm value in emerging markets. Journal of Financial and Quantitative Analysis 38, 159–184.

Mitton, T., 2002. A cross-firm analysis of the impact of corporate governance on the East Asian financial crisis. Journal of Financial Economics 64, 215–241.

Morck, R., 1996. On the economics of concentrated ownership. Canadian Business Law Journal 26, 63–75.

Morck, R., Yeung, B., Yu, W., 2000. The information content of stock markets: why do emerging markets have synchronous stock price movements?. Journal of Financial Economics 58, 215–260.

Petersen, M., 2009. Estimating standard errors in finance panel data sets: comparing approaches. Review of Financial Studies 22, 435–480.

Piotroski, J.D., Roulstone, D.T., 2004. The influence of analysts, institutional investors, and insiders on the incorporation of market, industry and firm-specific information into share prices. The Accounting Review 79, 1119–1151.

Roll, R., 1988. R^2. Journal of Finance 25, 545–566.

Scholes, M., Williams, J., 1977. Estimating betas from nonsynchronous data. Journal of Finance 5, 309–328.

Shleifer, A., Vishny, R., 1986. Large shareholders and corporate control. Journal of Political Economy 94, 461–488.

Shleifer, A., Vishny, R., 1989. Management entrenchment: the case of manager-specific investments. Journal of Financial Economics 25, 123–139.

Shleifer, A., Vishny, R., 1994. Politicians and firms. The Quarterly Journal of Economics 109, 995–1025.

Shleifer, A., Vishny, R.W., 1997. A survey of corporate governance. Journal of Finance 52, 737–783.

Shleifer, A., 1998. State versus private ownership. Journal of Economic Perspectives 12, 133–150.

Wang, Q., Wong, T.J., Xia, L., 2008. State ownership, institutional environment and auditor choice: evidence from China. Journal of Accounting and Economics 46, 112–134.

Watts, R.L., Zimmerman, J.L., 1986. Positive Accounting Theory. Prentice-Hall, Englewood Cliffs, NJ.

Yang, L., Tang, Q., Kiligore, A., Hong, Y., 2001. Auditor-government associations and auditor independence in China. British Accounting Review 33, 175–189.