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Large controlling shareholders and stock price synchronicity ☆

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ABSTRACT

This paper examines the effect of controlling shareholders on stock price synchronicity by focusing on two salient corporate governance features in a concentrated ownership setting, namely, ultimate cash flow rights and the separation of voting and cash flow rights (i.e., excess control). Using a unique dataset of 654 French listed firms spanning 1998–2007, this study provides evidence that stock price synchronicity increases with excess control, supporting the argument that controlling shareholders tend to disclose less firm-specific information to conceal opportunistic practices. Additionally, this study shows that firms with substantial excess control are more likely to experience stock price crashes, consistent with the conjecture that controlling shareholders are more likely to hoard bad information when their control rights exceed their cash flow rights. Another important finding is that firms' stock prices are less synchronous and less likely to crash when controlling shareholders own a large fraction of cash flow rights. This is consistent with the argument that controlling shareholders have less incentive to adopt poor disclosure policies and to accumulate bad news, since high cash flow ownership aligns their interests with those of minority investors.

1. Introduction

In his presidential address, Roll (1988) argues that the extent to which stock prices move together depends on the relative amounts of firm-specific and market-level information impounded into stock prices. The author finds that broad market and industry influences explain only a small portion of stock price movements.[1] Building on these findings, Morck et al. (2000) show that *R*-squared is lower in countries that properly protect investors' property rights.[2] They argue that better protection encourages informed trading, which facilitates the incorporation of firm-specific information into stock prices, leading to lower synchronicity. These seminal papers have motivated several follow-up studies that examine the association between stock price synchronicity and efficient capital allocation (Pindyck and Rotemberg, 1993; Wurgler, 2000), analyst activity (Piotroski and Roulstone, 2004; Chan and Hameed, 2006), earnings informativeness (Durnev et al., 2003), corporate transparency (Jin and Myers, 2006), voluntary disclosure (Haggard et al., 2008), earnings management (Hutton et al., 2009), audit quality (Gul et al., 2010), and the adoption of International Financial Reporting Standards (Kim and Shi, 2012).

However, a huge body of research documents that ownership structure affects the informational environment of a firm and its decision making. For instance, Ball et al. (2003) argue that, beyond accounting standards, the distribution of cash flow and voting rights shapes the outcome of financial reporting procedures. Other studies also show that ownership structure turns out to explain earnings management (Warfield et al., 1995), earnings informativeness (Fan and Wong, 2002), analyst following (Lang et al., 2004; Boubaker and Labégorre, 2008), accounting conservatism (Lafond and Roychowdhury, 2008), and the cost of corporate borrowing (Boubakri and Ghouma, 2010; Lin et al., 2011), among others.

This paper brings together these two strands of literature by addressing the important but hitherto underexplored question of whether ownership structure matters in explaining the synchronicity of stock price movements. In particular, it focuses on two important corporate governance characteristics in an environment where ownership is concentrated, namely, the ultimate cash flow

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[1] Roll (1988) documents that market-wide information explains, on average, 35% (20%) of a firm's monthly (daily) stock returns.

[2] The *R*-squared of Morck et al. (2000) is obtained from a modified market model regression.

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rights of controlling shareholders and the separation of voting and cash flow rights.[3] This study is also motivated by a growing literature providing evidence that corporate governance explains cross-sectional variations in stock returns (Gompers et al., 2003; Cremers and Nair, 2005; Bebchuk et al., 2009). More specifically, it follows in the footsteps of Gompers et al. (2010), who attempt to assess the direct linkage between ownership structure and stock returns in U.S. dual-class firms. This linkage is based on the idea that ownership structure affects managerial incentives and therefore exacerbates/mitigates agency problems between controlling and minority investors, which affects firms' information environment and stock returns.

Contrary to Berle and Means (1932), the corporate governance literature establishes that the presence of controlling shareholders is pervasive around the world (La Porta et al., 1999). Holderness et al. (1999) find that firms with dominant shareholders are widespread, even in the United States. Claessens et al. (2000) examine a sample of 2982 listed firms in nine East Asian countries. They find that roughly 67% of the sample firms are controlled by at least one large shareholder. Similarly, Faccio and Lang (2002) study the shareholdings of 5232 listed firms covering 13 Western European countries. They show that ownership structure is concentrated in around 63% of the firms.

These studies have cast doubt on the ownership structure of the modern corporation pictured by Berle and Means (1932) and have therefore shown that the relevant agency problem is not between shareholders and professional managers (Jensen and Meckling, 1976) but between large shareholders and minority investors, as advanced by Shleifer and Vishny (1997). Theoretical papers argue that ownership concentration helps mitigate agency conflicts between large and small shareholders inasmuch as higher ownership stakes increase the interest of large shareholders in a firm. As evidenced in previous empirical studies, concentrated ownership improves the informational environment of the firm (e.g., Warfield et al., 1995). Considering this line of inquiry, our study aims to examine the effect of ownership concentration on the information content of firms' stock prices and particularly stock price synchronicity.

However, due to the extensive use of control-enhancing mechanisms, including dual-class stocks and pyramid schemes, voting rights often exceed cash flow rights. Therefore, large shareholders are endowed with enhanced control compared to their interests in the firm, which may give rise to agency conflicts with minority investors that can take the form of private benefit consumption through tunneling (Bertrand et al., 2002), outright theft (Shleifer and Vishny, 1986; Johnson et al., 2000), inefficient empire building acquisitions (Masulis et al., 2009), the misuse of cash stockpiles (Attig et al., 2009), and higher employee remuneration (Cronqvist et al., 2009), among other things. Moreover, numerous studies provide evidence that the control–ownership wedge shapes the corporate information environment (Fan and Wong, 2002; Haw et al., 2004; Attig et al., 2006). However, the way it impinges on the information content of stock prices remains an intriguing and little explored question. Our study aims to fill this void.

Using a sample of 654 French listed firms from 1998 to 2007, we document a strong positive relationship between the control–ownership wedge and stock price synchronicity. This result supports our hypothesis that the separation of control and cash flow rights precludes information disclosure to the market. Conversely, we find that synchronicity decreases with the ultimate cash flow rights of the largest controlling shareholder, which is consistent with the argument that concentrated ownership facilitates the dissemination of firm-specific information. We conduct further analyses to examine the relation between ownership structure and crash risk. Our results show that firms with a larger control–ownership wedge (cash flow concentration) feature more (fewer) stock price crashes.

This paper contributes to the literature that studies the effect of ownership structure on stock price behavior in several ways. First, it empirically tests the effect of the separation of control and cash flow rights on stock price synchronicity. To the best of our knowledge, the current paper is the first to directly address this issue. Second, a large amount of research examines how stock price cash risk is influenced by the extent of voluntary disclosure (Haggard et al., 2008), financial statement transparency (Hutton et al., 2009), equity incentives (Kim et al., 2011a), corporate tax avoidance (Kim et al., 2011b), institutional investors (Callen and Fang, 2012), and management earnings guidance (Hamm et al., 2012), among other things. This paper provides new evidence to this fast-growing literature by examining how the control–ownership wedge and cash flow concentration affect stock price crash risk. Finally, unlike Brockman and Yan (2009), who conduct their study in the U.S. context, where ownership is widely dispersed and the relevant agency problem is between professional managers and all shareholders, and Gul et al. (2010), who focus on the Chinese context, where firms are typically state owned, we carry out our analysis in a concentrated ownership environment, namely, France, dominated by family firms and characterized by a substantial separation of control and cash flow rights maintained mainly through non-voting shares, double-voting shares, and pyramid schemes. This framework allows us to trace ownership structure back to the ultimate owner and, hence, to accurately assess the severity of agency problems between controlling and minority shareholders.

The remainder of the paper is structured as follows. Section 2 develops our hypotheses. Section 3 describes the data and presents the construction of the variables. Section 4 reports summary statistics and correlations between the variables. Section 5 discusses the empirical results. Section 6 conducts additional analyses. Section 7 performs various robustness checks and the final section concludes the paper.

2. Hypothesis development

This section develops our hypotheses on the effect of ownership structure on the extent to which stock prices impound industry- and market-wide information relative to firm-specific information in a concentrated ownership context. In particular, it focuses on how stock price synchronicity is affected by the separation of voting and cash flow rights and ownership concentration.

2.1. Excess control and stock price synchronicity

Grossman and Hart (1988) demonstrate that deviation from the one share–one vote rule maximizes the benefits of control for the controlling party relative to security holders and thus may not be socially optimal. Shleifer and Vishny (1997) argue that as ownership increases beyond a certain level, insiders gain almost full control of the firm and may prefer to extract private benefits of control that do not accrue to minority shareholders. This problem is more pronounced when control rights exceed cash flow claims (Claessens et al., 2002). Bebchuk (1999) demonstrates that when the private benefits of control are sizable, controlling shareholders strive to maintain a lock on the firm to maximize rent extraction.

Based on these arguments, we claim that a significant control–ownership wedge undermines the corporate informational environment. The underlying premise is that controlling shareholders, to hide any egregious opportunistic behavior, may opt for poor

[3] Since corporate control is measured based on voting rights, we use the terms *voting rights* and *control rights* interchangeably. We also use *excess control and control–ownership wedge* as substitutes.

disclosure policies by either reducing information disclosure to outsiders or publishing unintelligible, untimely, or irrelevant information.[4]

Vast empirical evidence is consistent with the above arguments. Emphasizing the role of both legal and extra-legal institutions, Haw et al. (2004) document that a large control–ownership wedge stimulates insiders' proclivity for aggressive income management. Consistently, Fan and Wong (2002) argue that earnings are less informative when the separation of control and cash flow rights is substantial, since controlling shareholders are perceived to alter accounting information.[5] Attig et al. (2006) assert that such separation allows controlling shareholders to pursue personal agendas at minority shareholders' expense through minimizing and delaying information disclosure. The authors document that a large control–ownership wedge increases the information asymmetry component of the bid–ask spread, leading to less liquid stocks. Lee (2007) finds that in the very situation where control exceeds cash flow rights, reducing corporate voluntary disclosure represents a mechanism that allows dominant shareholders to continue obtaining higher private benefits of control without being easily detected by minority investors. More recently, Bona-Sánchez et al. (2011) find that large controlling shareholders are less likely to recognize losses on a timely basis in firms exhibiting greater separation of control and cash flow rights. The underlying premise behind this result is that these firms are perceived to have higher expropriation risk and therefore face higher external financing costs. Controlling shareholders are consequently more likely to rely on internal financing channels, which reduces the demand for conservative financial reporting.

The above arguments suggest that firms are more likely to disseminate low-quality financial information material when the control–ownership wedge is large. Hence, less accurate firm-specific information is available to outsiders. In a seminal paper, Jin and Myers (2006) set up a model in which they show that lack of transparency about a firm's performance, that is, opaqueness, shapes the division of risk bearing between insiders and outside investors. The underlying rationale is that insiders have incentives to operate in a less transparent information environment when higher opaqueness allows them to extract private benefits by capturing more cash flows from profitable firms. Thus, insiders bear a higher proportion of firm-specific risk, reducing the amount of firm-specific risk absorbed by outside investors. Using a panel of 40 countries, these authors give empirical support to their theoretical model by showing that greater opaqueness translates to higher levels of stock price synchronicity. A growing body of research is also consistent with these findings. For example, Haggard et al. (2008) find that firms with reduced voluntary disclosure policy, as proxied by lower Association for Investment Management and Research rankings, have greater stock price comovement. Hutton et al. (2009) show that firm opacity reduces idiosyncratic volatility. Khanna and Thomas (2009) document that blurred firm boundaries resulting from networks of shared ownership, equity ties, and interlocking directorates reduce firm-level transparency, resulting in higher stock price synchronicity. Gul et al. (2011) find that Chinese firms with high levels of perk consumption are less likely to appoint a high-quality auditor, which precludes, in turn, the incorporation of firm-specific information into stock prices, leading to more synchronous stock returns.

All in all, the literature shows that the separation of control and cash flow rights undermines firms' financial reporting quality and exacerbates information asymmetry problems between large and small investors. Based on the theoretical predictions of Jin and Myers' (2006) model, we expect that the stock prices of firms with a large control–ownership wedge are less likely to incorporate firm-specific information compared to market-level information and are thus more synchronous with broad market movements. Drawing on the above discussion, we posit the following hypothesis.

H_1. Stock price synchronicity increases with the excess control of the ultimate controlling shareholder.

2.2. Ownership concentration and stock price synchronicity

The literature suggests that ownership concentration helps mitigate the conflict of interests between controlling and minority shareholders. For example, Grossman and Hart (1980) contend that concentrated ownership is expected to alleviate the free-rider problem by giving shareholders with substantial ownership incentives to effectively control firm activities. Consistently, Demsetz (1983) and Shleifer and Vishny (1986) argue that the existence of large shareholders leads to the better monitoring of incumbent managers and thus curbs the extraction of private benefits. Gomes (2000) develops a model that shows that higher ownership concentration serves to build a reputation for insiders who credibly commit themselves to not expropriate outside investors. Thus, controlling shareholders may be reluctant to indulge in opportunistic rent-seeking activities, to preserve their reputation, and are consequently more inclined to disclose credible and high-quality information for the benefit of minority shareholders. This is consistent with Fama (1980) and Diamond (1989), who theorize that reputation plays a disciplinary role in financial markets and helps mitigate agency problems and information asymmetry between managers and outside investors. Faure-Grimaud and Gromb (2004) propound another plausible explanation of the incentive alignment effect of concentrated ownership. They claim that large shareholders have incentives to pursue value-increasing activities since stock prices make their efforts observable to outsiders through public trading.

Drawing on the above arguments, we argue that large shareholders are less inclined to conceal information when they hold large ownership stakes in a firm. Rather, they have incentives to disseminate more and better firm-specific information. Empirically, Warfield et al. (1995) report a decrease in the magnitude of discretionary accounting accrual adjustments along with an increase in earnings informativeness as insider ownership increases. Yafeh and Yosha (2003) show that high ownership levels are associated with lower discretionary expenditures.

Grossman and Stiglitz (1980) contend that inexpensive private information acquisition increases informed trading and leads to more informative pricing. In the spirit of Grossman and Stiglitz (1980), Veldkamp (2006) sets out a model showing that cheaper access to firm-specific information reduces investor reliance on market- and industry-wide signals when pricing individual assets, which leads to lower stock price comovement. Piotroski and Roulstone (2004) argue that the incorporation of information into

[4] Admittedly, controlling shareholders may resolve information asymmetry through more reliance on private communication channels, rather than public disclosure, when they hold substantial voting rights, which undermines the firm's information environment and yields higher stock price synchronicity.

[5] Although some of our results are expected, based on Fan and Wong (2002), there are several important differences between the two papers. First, we provide a more thorough understanding of how controlling shareholders influence stock price behavior by examining the effect of ultimate cash flow rights and excess control on stock return synchronicity, crash risk likelihood, and crash risk frequency. Second, we rely on a market-based measure of price informativeness instead of an accounting-based measure as in Fan and Wong (2002). This point is particularly important, since Jin and Myers (2006) argue that accounting numbers are more likely to be meaningless and misleading, even in the United States, which may garble the return–earnings association. Moreover, several papers contend that accounting earnings do not precisely reflect a firm's underlying fundamentals in weak investor protection environments, such as France, which makes the return–earnings relation less accurate to capture stock price informativeness.

stock prices depends on the informational advantage of different market participants. The authors claim that high ownership facilitates access to firm-level information and encourages informed trading, reducing stock price synchronicity. Since controlling shareholders are more likely to disseminate more firm-specific information (Gul et al., 2010), we expect that owning a large fraction of a firm's shares increases the amount of firm-level information available to the market, which reduces reliance on market-wide information and decreases the synchronicity of stock price movements.

Studying U.S. firms, Brockman and Yan (2009) find that ownership concentration encourages the incorporation of firm-specific information into stock prices, thus leading to a higher probability of informed trading, more idiosyncratic variation, and less synchronicity. Similar results are found for Chinese firms by Gul et al. (2010), who show that synchronicity decreases for firms with higher direct ownership levels. Based on the previous discussion, we present our testable hypothesis as follows.

H_2. Stock price synchronicity decreases with the cash flow rights of the ultimate controlling shareholder.

3. Data and variable construction

We start our sample with all French listed firms during 1998–2007 appearing in the Worldscope database. For conformity with previous studies, we confine our analysis to non-financial firms, since financial corporations—those with Standard Industrial Classification (SIC) codes 6000–6999—are heavily regulated and governed by specific accounting standards, making their accounting numbers incomparable to those of other firms. We obtain weekly market- and firm-level returns from the Datastream database. For a firm to be included in the sample, we require it to have at least 30 weeks of observations. To identify firms listed on U.S. markets, we gather information on American Depository Receipt (ADRs) listings from the Bank of New York and Deutsche Bank databases. In the absence of a standardized database that contains ownership and control data, we hand-collect information on voting and cash flow rights from firms' annual reports, available on firms' websites or from the *Autorité des Marchés Financiers*.[6] Firms with insufficient ownership information or missing financial data for computing control variables were excluded from the sample. We allow firms to enter and exit the panel to limit the effect of survivorship bias. After these screens are applied, our (unbalanced) sample consists of 654 unique firms, totaling 4561 firm–year observations.[7] Table 1 provides sample distributions by year and by industry. Panel A shows that there is no significant difference in the number of observations across the sample years. Panel B reports the sample distribution by industry based on Campbell's (1996) industry classification. Most of the observations come from three main industries: services (24.38%), consumer durables (18.83%), and textile and trade (11.29%). These industries account for about 55% of the whole sample. Firms belonging to the petroleum industry are the least represented, with less than 1% of the sample firms.

Table 1
Sample characteristics.

Fiscal year	Number of observations	Percentage
Panel A: Year distribution		
1998	436	9.56
1999	437	9.58
2000	432	9.47
2001	453	9.93
2002	487	10.68
2003	484	10.61
2004	457	10.02
2005	448	9.82
2006	452	9.91
2007	475	10.42
Total	4561	100.00
Industry	**Number of observations**	**Percentage**
Panel B: Industry distribution		
Petroleum (SIC 13, 29)	38	0.83
Consumer durables (SIC 25, 30, 36, 37, 50, 55, 57)	859	18.83
Basic industry (SIC 10, 12, 14, 24, 26, 28, 33)	460	10.09
Food and tobacco (SIC 1, 20, 21, 54)	313	6.86
Construction (SIC 15, 17, 32, 52)	206	4.52
Capital goods (SIC 34, 35, 38)	488	10.70
Transportation (SIC 40, 42, 44, 45, 47)	115	2.52
Utilities (SIC 46, 48, 49)	175	3.84
Textiles and trade (SIC, 22, 23, 31, 51, 53, 56, 59)	515	11.29
Services (SIC 72, 73, 75, 80, 82, 89)	1112	24.38
Leisure (SIC 27, 58, 70, 78, 79)	280	6.14
Total	4561	100.00

This table (Panel A) reports the sample distribution across years. Panel B reports the sample distribution across industries based on Campbell's (1996) industrial classification. The sample contains 4561 firm–year observations from 1998 to 2007. Financial firms (SIC 60–69) are discarded from our sample.

3.1. Ownership structure variables

The procedure of identifying ultimate ownership and control patterns follows the approach outlined by La Porta et al. (1999) and Faccio and Lang (2002). In each layer of the control chain, we identify the direct owner of the firm, the direct owner of this direct owner, and so on, until we reach the ultimate owner, that is, a shareholder who maintains at least 10% of a firm's voting rights without being controlled by anyone else.[8] Ultimate owners fall into one of four categories: family, state, widely held firm, and widely held financial institution. If no shareholder holds more than 10% of the voting rights, then the firm is considered to be widely held at that threshold.[9] We compute the ultimate cash flow rights of the largest controlling shareholder (*UCF*) as the sum of the products of direct cash flow rights along the different ownership chains and its ultimate control rights as the sum of the weakest links across all these chains. Excess control (*Excess*) is defined as the difference between the ultimate control and cash flow rights of the largest controlling shareholder, scaled by ultimate control rights ($UCO - UCF)/UCO$). Appendix B (Figs. 1 and 2) describes the method of computing ownership and control variables using two actual examples.

3.2. Stock price synchronicity

We use the stock price synchronicity proposed by Roll (1988) and further developed by Morck et al. (2000) as a proxy for

[6] *Autorité des Marchés Financiers* is the French equivalent of the U.S. Securities and Exchange Commission.

[7] We apply additional screens by excluding regulated utilities (SIC codes 4900–4999) and cross-listed firms to ensure that all sampled firms operate under the same information environment and face the same disclosure requirements. Overall, the inclusion of these firms does not seem to change our main results (unreported).

[8] Although setting a control cutoff point of 10% is somewhat arbitrary, a substantial body of literature argues that this level is sufficient to exert effective control over a firm. Besides, the use of a 10% threshold is common in the relevant literature (e.g., La Porta et al., 1999; Claessens et al., 2002; Attig et al., 2006). To ensure the robustness of our findings, we repeat the analysis using the control cutoff point of 20%. Our results remain qualitatively unchanged (see Table 10, Eq. (5)).

[9] We follow Haw et al. (2004) and Attig et al. (2006), among others, and assign a value of zero to the control–ownership wedge of widely held firms. As a robustness check, we exclude these firms and repeat our tests with only the sample of controlled firms. The results remain qualitatively unaffected (see Table 10, Eq. (6)).

Table 2
Summary statistics.

Variables	Mean	S.D.	5th percentile	25th percentile	Median	75th percentile	95th percentile
R-squared	0.2648	0.2203	0.0501	0.1144	0.1929	0.3346	0.8138
SYNCH	−1.2273	1.1697	−2.9290	−2.0404	−1.4236	−0.6633	1.6924
Excess	0.2113	0.2157	0.0000	0.0165	0.1772	0.3200	0.6550
UCO	0.5105	0.2502	0.0950	0.3086	0.5288	0.7094	0.8883
UCF	0.4122	0.2489	0.0510	0.2058	0.4021	0.6007	0.8480
LEV	0.2231	0.2416	0.0048	0.0772	0.1973	0.3200	0.5154
STDRET	0.0310	0.0179	0.0124	0.0188	0.0259	0.0376	0.0670
AMIHUD	0.0224	0.0355	0.00002	0.0013	0.0117	0.0349	0.0736
ROACORR	0.2290	0.7092	−0.9733	−0.4296	0.4581	0.9031	0.9974
LOG (NIND)	3.3292	1.0485	1.7917	2.5941	3.0667	4.2637	5.0350
DIVERS	4.0228	1.9421	1	3	3	5	8
XLIST	0.0695	0.2543	0	0	0	0	1
SIZE	11.6030	2.1621	8.6128	10.0530	11.3222	12.8557	15.7754

This table provides summary statistics of all variables used in the paper. The sample contains 4561 firm–year observations from 1998 to 2007. *SYNCH* is our measure of stock price synchronicity and is defined as a logistic transformation of *R*-squared obtained from a modified market model regression. *Excess* is a proxy for excess control. It is defined as the difference between the control and cash flow rights of the largest controlling shareholder, scaled by control rights ((*UCO* − *UCF*)/*UCO*). *UCO* (*UCF*) is the ultimate control (cash flow) rights of the largest controlling shareholder. *LEV* is the financial leverage defined as book value of total liabilities divided by total assets (all at the beginning of the year). *STDRET* is the standard deviation of the firm's daily stock returns in year *t*. *AMIHUD* is the Amihud's (2002) price impact ratio, defined as the yearly average ratio of daily absolute returns to the daily trading volume in monetary terms. *ROACORR* is the Spearman correlation between the firm's return on assets and its industry average return on assets over the past five years, including year *t*. *LOG* (*NIND*) is the natural logarithm of the average number of firms (in the industry to which the firm belongs) that were used to calculate the weekly industry return index. *DIVERS* measures firm diversification and is calculated as the number of four-digit SIC code industries in which the firm operates. *XLIST* is a dummy variable that takes the value of one if the firm has ADRs traded in the United States and zero otherwise. *SIZE* is computed as the natural logarithm of market capitalization at the end of the year.

the extent to which equity returns capitalize market- and industry-related information. Synchronicity is often measured by the regression's *R*-squared value of individual stock returns on market and industry indexes. The larger *R*-squared an individual firm has, the more its stock prices are synchronous with market and/or industry returns. A large and growing body of empirical evidence supports the informational interpretation of this proxy (Durnev et al., 2003, 2004; Jin and Myers, 2006; Ferreira and Laux, 2007). Consistent with Piotroski and Roulstone (2004), we gauge stock price synchronicity by estimating the following modified market model for each firm–year[10]:

$$RET_{i,w} = \alpha + \beta_1 MKRET_{w-1} + \beta_2 MKRET_w + \beta_3 INDRET_{i,w-1} + \beta_4 INDRET_{i,w} + \varepsilon_{i,w} \quad (1)$$

where $RET_{i,w}$ is firm *i*'s return on week *w*, $MKRET_w$ is the value-weighted market return (based on the SBF 250 index) for week *w*, and $INDRET_{i,w}$ is the industry value-weighted return excluding firm *i*'s weekly return, to avoid any spurious correlation. We define industries based on the 48-industry classification of Fama and French (1997).

The *R*-squared value obtained from the above regression cannot be used as a dependent variable since it is bounded within the unit interval. Following Morck et al. (2000), we apply a logistic transformation that allows the transformed variable to range from negative infinity to positive infinity. Therefore, our synchronicity proxy is defined as

$$SYNCH = \log\left(\frac{R^2_{i,t}}{1 - R^2_{i,t}}\right) \quad (2)$$

where $R^2_{i,t}$ is the *R*-squared value from regression (1) for firm *i* in year *t*.

4. Summary statistics and correlation matrix

This section provides summary statistics and the correlation coefficients of the variables used in the analysis. Table 2 reports the descriptive statistics for these key variables. The dependent variable *SYNCH* has mean and median values of −1.22 and −1.42, respectively. These values are higher than those reported by Piotroski and Roulstone (2004), who document a mean and a median of −1.74 and −1.75, respectively. This suggests that the stock prices of French firms tend to incorporate higher industry and market information (as opposed to firm-specific information) than U.S. firms, which is consistent with the results of Morck et al. (2000). Moreover, *SYNCH* has a standard deviation of 1.16, indicating that stock price synchronicity displays considerable cross-sectional variation. Controlling shareholders hold more control rights than cash flow rights—with a mean (median) of 51.05% (52.88%) versus 41.22% (40.21%)—which allows them to have a mean (median) excess control of 21.13% (17.72%). These results are similar to those of Boubaker and Labégorre (2008), who report an average (median) excess control of 24.97% (21.97%) for their sample in 2000, consistent with findings that French firms exhibit a large control–ownership wedge. Table 2 also shows that our sample includes both low- and high-leverage firms (with a mean and standard deviation for *LEV* of 0.22 and 0.24, respectively) and small and large firms (with a mean and standard deviation for *SIZE* of 11.60 and 2.16, respectively). These firms operate, on average, in several business segments (with a mean and median for *DIVERS* of 4.02 and 3.00, respectively) and very few of them cross-list in the U.S. stock market (with a mean *XLIST* of 6.95%). Appendix A provides the definitions of all the variables used in the analysis.

Table 3 reports the correlation coefficients between the main variables used in the study. Pearson (Spearman) correlation coefficients are portrayed above (below) the diagonal.[11] Several key relations are worth noting. First, the correlation between *Excess* and *SYNCH* is positive and statistically significant at the 1% level. Second, *UCF* displays a negative and highly significant correlation with *SYNCH*. Third, all control variables except *LEV* are significantly

[10] We include lagged market and industry returns to account for the impact that informed participants have on the timing of information capitalization into stock prices (Piotroski and Roulstone, 2004).

[11] The matrix of correlations gives us preliminary insight into the relation between dependent and independent variables. It also helps us detect potential multicollinearity that could lead to spurious estimations. We assess this problem by calculating the variance inflation factor for all independent variables. All computed variance inflation factors range from 1.01 to 1.57 and are hence below the rule of thumb threshold of 10 (Chatterjee and Hadi, 2006). This implies that multicollinearity is less likely to be a serious issue in our study.

Table 3
Correlation matrix.

Variable	*SYNCH*	*Excess*	*UCF*	*LEV*	*STDRET*	*AMIHUD*	*ROACORR*	*LOG (NIND)*	*DIVERS*	*XLIST*	*SIZE*
SYNCH	1	0.1293[a]	−0.3521[a]	0.0193	−0.1670[a]	0.3680[a]	0.0506[a]	−0.0548[a]	0.1664[a]	0.2859[a]	0.5163[a]
Excess	0.2127[a]	1	−0.4136[a]	0.0038	−0.0442[a]	0.0676[a]	0.0021	0.0478[a]	0.0364[b]	−0.0414[a]	0.0542[a]
UCF	−0.3671[a]	−0.4858[a]	1	−0.0026	0.0359[b]	−0.3530[a]	−0.0665[a]	−0.1004[a]	−0.0615[a]	−0.2578[a]	−0.3087[a]
LEV	0.0241	−0.0063	0.0038	1	−0.0476[a]	0.0492[a]	0.0176	−0.1935[a]	0.0984[a]	0.0656[a]	0.0525[a]
STDRET	−0.0536[a]	−0.0257[c]	0.0080	0.0222	1	−0.2150[a]	0.0693[a]	0.1905[a]	−0.2599[a]	−0.1165[a]	−0.3060[a]
AMIHUD	0.1218[a]	0.0533[a]	−0.1398[a]	0.0204	−0.2157[a]	1	0.0137	0.0177	0.1684[a]	0.3141[a]	0.5898[a]
ROACORR	0.0687[a]	0.0255[c]	−0.0654[a]	0.0393[a]	−0.0037	−0.0108	1	0.0027	−0.0560[a]	−0.0023	0.0562[a]
LOG (NIND)	−0.1239[a]	0.0074	−0.0947[a]	−0.1708[a]	0.0143	0.0182	0.0093	1	−0.1628[a]	−0.0130	−0.0534[a]
DIVERS	0.2440[a]	0.0663[a]	−0.0758[a]	0.0863[a]	−0.0455[a]	0.0934[a]	−0.0523[a]	−0.1972[a]	1	0.1845[a]	0.3118[a]
XLIST	0.3546[a]	0.0107	−0.2473[a]	0.0551[a]	−0.0261[c]	0.1072[a]	−0.0034	−0.0047	0.2032[a]	1	0.3662[a]
SIZE	0.5998[a]	0.1038[a]	−0.3233[a]	0.0452[a]	−0.0476[a]	0.2737[a]	0.0492[a]	−0.0697[a]	0.3677[a]	0.4453[a]	1

This table reports the correlation coefficients between variables used in the paper. The sample contains 4561 firm–year observations from 1998 to 2007. *SYNCH* is our measure of stock price synchronicity and is defined as the logistic transformation of *R*-squared obtained from a modified market model regression. *Excess* is a proxy for excess control. It is defined as the difference between the control and cash flow rights of the largest controlling shareholder, scaled by control rights ((*UCO* − *UCF*)/*UCO*). *UCF* is the ultimate cash flow rights of the largest controlling shareholder. *LEV* is the financial leverage defined as book value of total liabilities divided by total assets (all at the beginning of the year). *STDRET* is the standard deviation of the firm's daily stock returns in year *t*. *AMIHUD* is the Amihud's (2002) price impact ratio, defined as the yearly average ratio of daily absolute returns to the daily trading volume in monetary terms. *ROACORR* is the Spearman correlation between the firm's return on assets and its industry average return on assets over the past five years, including year *t*. *LOG* (*NIND*) is the natural logarithm of the average number of firms (in the industry to which the firm belongs) that were used to calculate the weekly industry return index. *DIVERS* measures firm diversification and is calculated as the number of four-digit SIC code industries in which the firm operates. *XLIST* is a dummy variable that takes the value of one if the firm has ADRs traded in the United States and zero otherwise. *SIZE* is computed as the natural logarithm of market capitalization at the end of the year. Pearson (Spearman) correlations are below (above) the diagonal.

[a] Statistical significance at the 1% level.
[b] Statistical significance at the 5% level.
[c] Statistical significance at the 10% level.

correlated with *SYNCH* and generally in the expected directions documented in previous literature. The Pearson and Spearman correlations provide qualitatively the same results, with similar magnitudes and significance levels for all variables. Collectively, these findings lend preliminary support to our theoretical predictions.

5. Regression results

This section examines the effect of ownership and control structure variables on stock price synchronicity by running the following regression model

$$SYNCH_{i,t} = \beta_0 + \beta_1 Excess_{i,t} + \beta_2 UCF_{i,t} + \sum_k \beta_k Control^k_{i,t} + IndustryDummies + YearDummies + \varepsilon_{i,t} \quad (3)$$

where the subscripts *i* and *t* represent the firm and the year, respectively; *k* refers to control variables; *Excess* proxies for the control–ownership wedge of the largest controlling shareholder; and *UCF* is its ultimate cash flow rights. We use a set of firm- and industry-specific variables deemed to influence stock price synchronicity. These variables are gleaned from previous relevant studies and include leverage, return volatility, stock liquidity, the correlation between a firm's earnings and industry-level earnings, firm diversification, U.S. cross-listings, and firm size. We control also for industry and year fixed effects.

Leverage: Prior studies have shown that financial leverage is important in explaining the cross-sectional variation in stock return volatility. Hutton et al. (2009) argue that higher leverage shifts risk from equity to debtholders, who bear higher idiosyncratic volatility, hence reducing stock price synchronicity. Contrariwise, Rajgopal and Venkatachalam (2011) contend that levered firms are exposed to higher financial distress, making their stock returns more volatile. We measure firm leverage (*LEV*) as the book value of total liabilities at the beginning of the year divided by total assets at the beginning of the year.

Return volatility: We control for return volatility (*STDRET*) inasmuch as firms with more volatile returns produce more firm-specific information and are hence less impacted by industry- and market-wide information (Chan and Hameed, 2006). Return volatility is calculated as the standard deviation of daily returns over the current fiscal year for the firm's stock.[12]

Stock liquidity: Chordia et al. (2008) provide evidence that greater liquidity improves market informational efficiency by incorporating more firm-specific information into stock prices. Stock liquidity (*AMIHUD*) is measured by Amihud's (2002) price impact ratio, defined as the yearly average ratio of daily absolute returns to daily trading volume in monetary terms.[13]

Correlation of firm earnings with industry-level earnings: Piotroski and Roulstone (2004) argue that when a firm's profitability is more highly correlated with its underlying industry's performance, stock prices within industries are more likely to be synchronous with the industry's index. Following Brockman and Yan (2009), we control for the correlation between firm earnings and industry average earnings using *ROACORR*, measured as the Spearman correlation between the firm's return on assets and its industry average return on assets over the past five years.

Firm diversification: Firms diversifying their operations among several business segments may be less sensitive to macroeconomic shocks in their primary industry affiliation. Their aggregate performance is less likely to track that of the main industry, which reduces *R*-squared (e.g., Piotroski and Roulstone, 2004). However, Roll (1988) clearly states that more diversified firms resemble diversified portfolios and thus carry more systematic market risk, leading to a higher *R*-squared value. Our proxy for firm diversification, *DIVERS*, is defined as the number of four-digit SIC code industries in which a firm operates.

U.S cross-listing: Firms that cross-list in the U.S. stock market are expected to have a better and more transparent information environment since they must comply with more stringent accounting standards and extensive reporting requirements. The proxy for U.S. cross-listing (*XLIST*) is a dummy variable that takes the value of one if the firm has ADRs traded in the United States that require reconciliation with U.S. Generally Accepted Accounting Principles and zero otherwise.

[12] In addition to this market-based measure of return volatility, we use an accounting-based measure of return volatility defined as the standard deviation of returns on assets. Our conclusions remain unchanged (see Table 10, Eq. (7)).

[13] As a robustness check, we include turnover as an alternative proxy for liquidity. The results remain qualitatively similar (see Table 10, Eq. (8)).

Firm size: Roll (1988) documents a strong positive relation between firm size and *R*-squared, indicating that the stock prices of larger firms tend to incorporate more market-wide information than those of small firms. Moreover, Piotroski and Roulstone (2004) argue that large firms can act as leading market indicators for small firms by revealing or signaling macroeconomic events, which results in higher stock price synchronicity. Firm size (*SIZE*) is defined as the natural logarithm of market capitalization at the end of the year.

Other control variables: We include the average number of firms in the industry to which the firm belongs (*NIND*) to control for differences in synchronicity arising from differences in sample size (Durnev et al., 2003). Industry and year dummies are also included to control for industry and time fixed effects.

We estimate Eq. (3) using a pooled ordinary least squares (OLS) regression with industry and year fixed effects. We correct standard errors for firm-level clustering. The first column of Table 4 reports the results of the baseline model when stock price synchronicity is regressed against ownership structure variables along with firm size.[14] Consistent with the correlation evidence, the coefficient of *Excess* is positive and statistically significant at less than the 1% threshold, suggesting that the separation of control and cash flows rights deters the flow of firm-specific information incorporated into stock prices. With less firm-level information available for pricing, firms' stock returns embody more industry- and market-related information, which translates into higher stock price synchronicity. Moreover, the coefficient for *UCF* is negative and statistically significant at less than the 1% level. This result is evidence that the stock prices of firms in which the controlling shareholder holds high cash flow interests incorporate more (less) firm-specific (industry- and market-wide) information, which reduces the synchronicity of stock price movements. This is consistent with the idea that the presence of a controlling shareholder owning a higher fraction of a firm's cash flow stakes enhances the firm's information environment and fosters the inclusion of firm-specific information into stock prices.

In the second column of Table 4, we expand our baseline model by adding a set of firm- and industry-level controls shown to affect stock price synchronicity (e.g., Piotroski and Roulstone, 2004; Brockman and Yan, 2009; Hutton et al., 2009). The effect of *Excess* (*UCF*) remains positive (negative) and statistically significant at less than the 1% level, with a relatively similar magnitude as in the baseline regression. In line with prior literature, *SIZE* has a positive and significant coefficient at the 1% level, implying that the stock prices of large firms incorporate more industry- and market-wide information than those of small firms (Roll, 1988). The coefficient for *AMIHUD* is positive and statistically significant at less than the 1% level, indicating that less liquid stocks incorporate less firm-specific information. This result is consistent with Chordia et al. (2008), who document a negative relationship between stock illiquidity and price informativeness. As for Brockman and Yan (2009), the coefficient for *ROACORR* is positive and significant at the 1% level, suggesting that firms' stock prices incorporate more market-wide information when their earnings are highly correlated with average industry earnings. We also find a positive and significant relation between *XLIST* and stock price synchronicity, further supporting the results of Fernandes and Ferreira (2008), who document that U.S. cross-listing is associated with reduced stock price informativeness for firms from countries with poor investor protection. The coefficients of *LEV* and *DIVERS* are found to be insignificant at all conventional levels.

[14] We repeat our baseline models by running two separate regressions that include only one variable at a time between *Excess* and *UCF*. The results (unreported) remain qualitatively the same as when we include *Excess* and *UCF* at the same time.

The next three columns of Table 4 replicate the previous regression, but using alternative measures for the control–ownership wedge. Eq. (3) uses the difference between ultimate control and cash flow rights of the largest controlling shareholder (*ExcessDiff*). Eq. (4) includes a dummy variable that equals one if control rights exceed cash flow rights (*ExcessDummy*) and zero otherwise, whereas Eq. (5) proxies for excess control, using a dummy variable that equals one if *Excess* is higher than the median excess control in firms where control is higher than ownership (*ExcessHigh*) and zero otherwise. For all three regression specifications, we find a positive and statistically significant (at less than the 1% level) relationship between the control–ownership wedge and stock price synchronicity. All in all, our results remain qualitatively similar and are thus robust to the use of these alternative proxies.

The last column of Table 4 compares the economic impact of independent variables on stock price synchronicity based on estimates from Eq. (2). On average, a one standard deviation increase in *Excess* results in an increase of 10% in stock price synchronicity. The separation of control and cash flow rights is thus economically significant. Moreover, a one standard deviation increase in *UCF* is associated with a 15.1% decrease in stock price synchronicity, indicating that ownership concentration also has an economically significant effect on synchronicity. Consistent with the findings of Hutton et al. (2009), firm size accounts for the largest economic impact on stock price synchronicity.

A potential concern with our pooled regressions is cross-sectional dependence. Accordingly, not correcting for this problem can result in biased standard errors, leading to incorrect inferences. We re-estimate all the equations of Table 4 using the two-step Fama and MacBeth (1973) method, including industry fixed effects. Specifically, this approach performs a cross-sectional regression for each year and then computes a time-series average, using each year as an independent observation. We then compute *t*-statistics using heteroskedasticity- and autocorrelation-consistent Newey and West (1987) standard errors. Following Jin and Myers (2006) and Haggard et al. (2008), we capture the serial correlation in the estimated coefficients using a first-order autoregressive process. The results reported in Table 5 are largely consistent with those derived from earlier pooled sample analysis.

Taken together, the main results portrayed in Tables 4 and 5 support the argument that the distribution of control and cash flow rights within a firm matters in explaining the behavior of its stock returns. More specifically, we find that the control–ownership wedge impedes the flow of firm-specific information to the market, leading to higher stock price synchronicity, which constitutes a novel result in the literature. Moreover, we document that ownership concentration expedites the capitalization of firm-specific information into stock prices and decreases synchronicity. This result extends and further supports the recent findings of Brockman and Yan (2009) and Gul et al. (2010), who also show that high ownership levels reduce synchronicity.

6. Additional analyses

This section performs further analyses. The first subsection investigates whether ownership and control structure variables explain additional stock price dynamics. More specifically, it examines whether the control–ownership wedge influences the likelihood that a firm experiences a large negative return, that is, crash risk. The second subsection considers the effect of the passage of the 2003 Financial Security Law (FSL). The last subsection analyzes the relation between ownership structure and stock price synchronicity, depending on the intensity of product market competition.

Table 4
Ownership structure and stock price synchronicity.

Independent variable	Expected sign	Baseline model	Full model				Economic impact (Eq. (2))
		Eq. (1)	Eq. (2)	Eq. (3)	Eq. (4)	Eq. (5)	
Excess	+	0.4340[a]	0.4619[a]				0.100
		(2.7801)	(3.4131)				
ExcessDiff	+			0.9153[a]			
				(3.4351)			
ExcessDummy	+				0.0995[b]		
					(2.1971)		
ExcessHigh	+					0.1433[a]	
						(3.1382)	
UCF	−	−0.6642[a]	−0.6052[a]	−0.7275[a]	−0.7255[a]	−0.6740[a]	−0.151
		(−5.7162)	(−5.6130)	(−7.5125)	(−6.4477)	(−6.0187)	
LEV	+/−		−0.0874	−0.1043	−0.0931	−0.0878	−0.021
			(−0.6386)	(−0.7636)	(−0.6794)	(−0.6414)	
STDRET	−		−0.3878[a]	−0.3824[a]	−0.3960[a]	−0.3952[a]	−0.007
			(−2.7929)	(−2.7977)	(−2.8127)	(−2.8034)	
AMIHUD	+		1.5637[a]	1.5733[a]	1.5941[a]	1.5788[a]	0.056
			(3.4752)	(3.4656)	(3.5632)	(3.5080)	
ROACORR	+		0.0536[b]	0.0526[b]	0.0557[b]	0.0565[b]	0.038
			(2.2553)	(2.2252)	(2.3335)	(2.3727)	
LOG (NIND)	?		−0.2101[a]	−0.2110[a]	−0.2100[a]	−0.2094[a]	−0.220
			(−5.7570)	(−5.6911)	(−5.6905)	(−5.6542)	
DIVERS	+/−		0.0217	0.0225	0.0235[c]	0.0226	0.042
			(1.5799)	(1.6409)	(1.6984)	(1.6275)	
XLIST	+/−		0.4402[a]	0.4291[a]	0.4210[a]	0.4288[a]	0.112
			(3.3607)	(3.3980)	(3.3282)	(3.3806)	
SIZE	+	0.3213[a]	0.2955[a]	0.2934[a]	0.2953[a]	0.2946[a]	0.639
		(21.4299)	(18.9320)	(18.7762)	(18.8792)	(18.8705)	
Intercept		−1.1752[a]	−1.0364[a]	−0.9710[a]	−0.9792[a]	−1.0010[a]	
		(−3.8217)	(−3.6233)	(−3.4784)	(−3.5666)	(−3.5848)	
Industry dummies		Yes	Yes	Yes	Yes	Yes	
Year dummies		Yes	Yes	Yes	Yes	Yes	
N		4561	4561	4561	4561	4561	
Adjusted R^2		0.4167	0.4491	0.4494	0.4451	0.4464	
F		41.12[a]	37.72[a]	36.74[a]	36.69[a]	37.34[a]	

This table reports OLS regression results of the effect of ownership structure on stock price synchronicity for a sample of 4561 firm–year observations from 1998 and 2007. The dependent variable is stock price synchronicity defined as the logistic transformation of the *R*-squared obtained from a modified market model regression. The main test variables are *Excess* defined as the difference between the control and cash flow rights of the largest controlling shareholder, scaled by control rights ((*UCO* − *UCF*)/*UCO*) and *UCF* defined as the ultimate cash flow rights of the largest controlling shareholder. For robustness, we use three additional proxies for the control-ownership wedge. These variables are *ExcessDiff* measured as the difference between control rights (*UCO*) and cash flow rights (*UCF*) of the largest controlling shareholder, *ExcessDummy* defined as a dummy variable that equals one if control rights (*UCO*) exceed cash flow rights (*UCF*); zero otherwise and *ExcessHigh* defined as a dummy variable that equals one if *Excess* is higher than the median excess control in firms where control (*UCO*) is higher than ownership (*UCF*); zero otherwise. Control variables include *LEV*, *STDRET*, *AMIHUD*, *ROACORR*, *LOG* (*NIND*), *DIVERS*, *XLIST* and *SIZE*. *LEV* is the financial leverage defined as book value of total liabilities divided by total assets (all at the beginning of the year). *STDRET* is the standard deviation of the firm's daily stock returns in year *t*. *AMIHUD* is the Amihud's (2002) price impact ratio, defined as the yearly average ratio of daily absolute returns to the daily trading volume in monetary terms. *ROACORR* is the Spearman correlation between the firm's return on assets and its industry average return on assets over the past five years, including year *t*. *LOG* (*NIND*) is the natural logarithm of the average number of firms (in the industry to which the firm belongs) that were used to calculate the weekly industry return index. *DIVERS* measures firm diversification and is calculated as the number of four-digit SIC code industries in which the firm operates. *XLIST* is a dummy variable that takes the value of one if the firm has ADRs traded in the United States and zero otherwise. *SIZE* is computed as the natural logarithm of market capitalization at the end of the year. Industry (using Campbell's (1996) industrial classification) and year dummies are also included in the regressions. The *t*-statistics reported in parentheses are based on standard errors clustered at the firm level.

[a] Statistical significance at the 1% level.
[b] Statistical significance at the 5% level.
[c] Statistical significance at the 10% level.

6.1. Crash risk

As documented in previous literature, excess control gives insiders incentives to opportunistically extract private benefits at the expense of small investors (e.g., Claessens et al., 2002). Insiders are thus more inclined to disguise adverse information from investors to mask their self-serving behavior. Kothari et al. (2009) contend that managers tend to withhold and delay the release of bad news when their interests are not aligned with those of outside shareholders. In the same line, Kim et al. (2011b) conjecture that insiders accumulate bad information through the adoption of tax avoidance activities to facilitate managerial rent diversion. However, Jin and Myers (2006) demonstrate that stockpiling bad news is not everlasting but, instead, continues only up to a certain threshold, above which all bad news is suddenly released, resulting in a significant downward stock price revision, that is, a stock price crash. Using several country-level measures of opaqueness, the authors show that firms from less transparent countries feature more frequent crashes. At the firm level, Haggard et al. (2008) document greater stock crash risk for firms with low voluntary disclosure levels. Hutton et al. (2009) show that greater accounting opacity, proxied by earnings management, is associated with more firm-specific stock price crashes. Cohen et al. (2011) reach similar results for the U.S. banking industry. Kim and Zhang (2010) provide evidence that the stock prices of firms with a less conservative reporting stance are more prone to crashes. Based on these arguments, we expect a positive relationship between the control–ownership wedge and crash risk.

Conversely, as the ownership stake of controlling shareholders increases, their interests in the firm become more aligned with those of minority shareholders, which curtails the potential extraction of private benefits. Consequently, the incentive to adopt a poor disclosure policy diminishes, resulting in increased firm transparency. Based on the theoretical predictions of Jin and Myers

Table 5
Ownership structure and stock price synchronicity (Fama and MacBeth (1973) regressions).

Independent variable	Expected sign	Baseline model	Full model				Economic impact (Eq. (2))
		Eq. (1)	Eq. (2)	Eq. (3)	Eq. (4)	Eq. (5)	
Excess	+	0.4203[a] (8.2821)	0.4319[a] (9.8971)				0.093
ExcessDiff	+			0.8499[a] (6.8730)			
ExcessDummy (4.7389)	+				0.0852[a]		
ExcessHigh	+					0.1287[a] (5.6281)	
UCF	−	−0.6795[a] (−13.9080)	−0.6157[a] (−14.3660)	−0.7322[a] (−18.8863)	−0.7397[a] (−15.2357)	−0.6887[a] (−17.9060)	−0.153
LEV	+/−		−0.1259 (−1.0353)	−0.1398 (−1.1418)	−0.1292 (−1.0452)	−0.1299 (−1.0516)	−0.030
STDRET	−		−0.3174[b] (−2.9661)	−0.3057[b] (−2.8589)	−0.3281[b] (−3.0412)	−0.3300[b] (−3.0545)	−0.006
AMIHUD	+		1.6603[a] (4.8400)	1.6877[a] (5.0554)	1.6983[a] (5.1627)	1.6595[a] (5.0222)	0.059
ROACORR	+		0.0638[a] (3.6260)	0.0624[a] (3.6679)	0.0651[a] (3.8332)	0.0661[a] (3.9606)	0.045
LOG (NIND)	?		−0.2076[a] (−16.6884)	−0.2084[a] (−16.7446)	−0.2078[a] (−16.7103)	−0.2075[a] (−16.1773)	−0.217
DIVERS	+/−		0.0202[b] (2.8268)	0.0212[b] (3.0133)	0.0216[b] (3.0086)	0.0207[b] (2.9984)	0.039
XLIST	+/−		0.4487[a] (11.4865)	0.4368[a] (11.4380)	0.4284[a] (11.3181)	0.4368[a] (11.5180)	0.114
SIZE	+	0.3187[a] (26.8572)	0.2863[a] (32.1764)	0.2840[a] (31.4588)	0.2859[a] (32.7908)	0.2851[a] (32.0559)	0.619
Intercept		−1.2694[a] (−11.9593)	−1.0330[a] (−9.1540)	−0.9751[a] (−8.1866)	−0.9722[a] (−8.2238)	−0.9907[a] (−8.4827)	
Industry dummies		Yes	Yes	Yes	Yes	Yes	
Year dummies		No	No	No	No	No	
N		4561	4561	4561	4561	4561	
Average R^2		0.4291	0.4722	0.4724	0.4682	0.4695	
F		80.19[a]	113.02[a]	114.00[a]	114.35[a]	115.96[a]	

This table reports the results of the effect of ownership structure on stock price synchronicity using the Fama and MacBeth (1973) method. The sample contains 4561 firm–year observations from 1998 to 2007.The dependent variable is stock price synchronicity defined as the logistic transformation of the *R*-squared obtained from a modified market model regression. The main test variables are *Excess* defined as the difference between the control and cash flow rights of the largest controlling shareholder, scaled by control rights ((*UCO* − *UCF*)/UCO) and *UCF* defined as the ultimate cash flow rights of the largest controlling shareholder. For robustness, we use three additional proxies for the control-ownership wedge. These variables are *ExcessDiff* measured as the difference between control rights (*UCO*) and cash flow rights (*UCF*) of the largest controlling shareholder, *ExcessDummy* defined as a dummy variable that equals one if control rights (*UCO*) exceed cash flow rights (*UCF*); zero otherwise and *ExcessHigh* defined as a dummy variable that equals one if *Excess* is higher than the median excess control in firms where control (*UCO*) is higher than ownership (*UCF*); zero otherwise. Control variables include *LEV*, *STDRET*, *AMIHUD*, *ROACORR*, *LOG* (*NIND*), *DIVERS*, *XLIST* and *SIZE*. *LEV* is the financial leverage defined as book value of total liabilities divided by total assets (all at the beginning of the year). *STDRET* is the standard deviation of the firm's daily stock returns in year *t*. *AMIHUD* is the Amihud's (2002) price impact ratio, defined as the yearly average ratio of daily absolute returns to the daily trading volume in monetary terms. *ROACORR* is the Spearman correlation between the firm's return on assets and its industry average return on assets over the past five years, including year *t*. *LOG* (*NIND*) is the natural logarithm of the average number of firms (in the industry to which the firm belongs) that were used to calculate the weekly industry return index. *DIVERS* measures firm diversification and is calculated as the number of four-digit SIC code industries in which the firm operates. *XLIST* is a dummy variable that takes the value of one if the firm has ADRs traded in the United States and zero otherwise. *SIZE* is computed as the natural logarithm of market capitalization at the end of the year. Industry dummies based on Campbell's (1996) classification are also included in the regressions. The *t*-statistics reported in parentheses are based on the heteroskedasticity and autocorrelation consistent Newey and West (1987) standard errors. We capture the serial correlation in the estimated coefficients using a one-order autoregressive process.

[a] Statistical significance at the 1% level.
[b] Statistical significance at the 5% level.
[c] Statistical significance at the 10% level.

(2006), we expect stock prices to be less likely to crash when ownership is highly concentrated.

To examine the relationship between ownership structure and stock price crash risk, we estimate the following model:

$$CrashRisk_{i,t} = \beta_0 + \beta_1 Excess_{i,t} + \beta_2 UCF_{i,t} + \sum_k \beta_k Control^k_{i,t} + IndustryDummies + YearDummies + \varepsilon_{i,t} \quad (4)$$

where *CrashRisk* denotes variables used to measure stock price crash risk, namely, *CRASH* and *NCRASH*. Specifically, *CRASH* is a dummy variable that equals one if the firm exhibits within its fiscal year one or more weekly residual returns falling *k* standard deviations below the mean weekly residual return over the entire fiscal year and zero otherwise, with *k* being chosen to generate frequencies of 1%, 2%, 3%, and 5% of the residual returns distribution, respectively, and *NCRASH* is the number of weeks in a fiscal year during which the firm experiences a stock price crash. We include firm leverage, stock return volatility, stock liquidity, the correlation between firm and industry returns on assets, firm diversification, U.S. cross-listing, and firm size as control variables. In addition, we control for industry and year fixed effects.

Table 6 presents the results of a logit regression analysis with *CRASH* as the dependent variable. The first column provides the results using *CRASH* based on the 1% cutoff of residual returns. The remaining columns use cutoffs of 2%, 3%, and 5% of the residual returns. As expected, the coefficient for *Excess* is positive and statistically significant for all cutoff levels, giving strong evidence that the control–ownership wedge increases firm opacity, leading to higher stock price crash risk. Inversely, we find a negative and

Table 6
Ownership structure and stock price crash risk – Logit regressions.

Independent variable	Expected sign	Cutoff level				Marginal effects (1% cutoff)
		1%	2%	3%	5%	
Excess	+	0.8122[a]	0.6779[a]	0.7026[a]	0.4775[b]	0.0314
		(3.1165)	(2.6960)	(2.7393)	(2.0083)	
UCF	−	−0.9979[a]	−0.9437[a]	−0.8603[a]	−0.7005[a]	−0.0516
		(−4.3682)	(−4.1100)	(−3.9528)	(−3.5887)	
LEV	?	0.8806[a]	0.6309[b]	0.5275[b]	0.3436[c]	0.0365
		(3.1854)	(2.5563)	(2.2767)	(1.6594)	
STDRET	?	42.3243[a]	45.1077[a]	47.3382[a]	54.7160[a]	0.7406
		(8.8969)	(8.0255)	(7.3198)	(6.8346)	
AMIHUD	?	7.2639	7.8870	7.5115	5.5503	0.0497
		(1.6296)	(1.6157)	(1.5401)	(1.3428)	
ROACORR	?	0.2008[a]	0.1826[a]	0.1981[a]	0.1505[a]	0.0245
		(2.9253)	(2.9111)	(3.2718)	(2.6857)	
LOG (NIND)	?	0.1276[c]	0.1203[c]	0.0975	0.0943	0.0230
		(1.7383)	(1.8019)	(1.4417)	(1.5761)	
DIVERS	?	−0.0803[b]	−0.1095[a]	−0.0905[a]	−0.0652[b]	−0.0286
		(−2.1969)	(−3.2664)	(−2.8607)	(−2.1841)	
XLIST	?	0.0152	−0.0246	0.0812	0.0146	0.0007
		(0.0642)	(−0.1055)	(0.3650)	(0.0680)	
SIZE	?	−0.1174[b]	−0.1000[b]	−0.1456[a]	−0.1569[a]	−0.0414
		(−2.5503)	(−2.2406)	(−3.3904)	(−4.1811)	
Intercept		−1.7772[a]	−1.5312[b]	−1.5557[b]	−0.9734	
		(−2.8243)	(−2.4026)	(−2.5121)	(−1.2814)	
Industry dummies		Yes	Yes	Yes	Yes	
Year dummies		Yes	Yes	Yes	Yes	
N		4561	4561	4561	4561	
Pseudo R^2		0.2204	0.2227	0.2252	0.2224	

This table presents the results on the relationship between ownership structure and stock price crash risk for a sample of 4561 firm–year observations from1998 to 2007observations using logistic regressions. The dependent variable (*CRASH*) is an dummy variable that equals to one if the firm exhibits within its fiscal year a weekly residual return below *k*-standard deviations of the mean weekly residual returns; zero otherwise. With *k* chosen to generate frequencies of 1%, 2%, 3% and 5% in the residual return distribution. *Excess* is a proxy for excess control. It is defined as the difference between the control and cash flow rights of the largest controlling shareholder, scaled by control rights ((*UCO* − *UCF*)/*UCO*). *UCF* is the ultimate cash flow rights of the largest controlling shareholder. Control variables include *LEV*, *STDRET*, *AMIHUD*, *ROACORR*, *LOG* (*NIND*), *DIVERS*, *XLIST* and *SIZE*. *LEV* is the financial leverage defined as book value of total liabilities divided by total assets (all at the beginning of the year). *STDRET* is the standard deviation of the firm's daily stock returns in year *t*. *AMIHUD* is the Amihud's (2002) price impact ratio, defined as the yearly average ratio of daily absolute returns to the daily trading volume in monetary terms. *ROACORR* is the Spearman correlation between the firm's return on assets and its industry average return on assets over the past five years, including year *t*. *LOG* (*NIND*) is the natural logarithm of the average number of firms (in the industry to which the firm belongs) that were used to calculate the weekly industry return index. *DIVERS* measures firm diversification and is calculated as the number of four-digit SIC code industries in which the firm operates. *XLIST* is a dummy variable that takes the value of one if the firm has ADRs traded in the United States and zero otherwise. *SIZE* is computed as the natural logarithm of market capitalization at the end of the year. Industry (using Campbell's (1996) industrial classification) and year dummies are also included in the regressions. The *z*-statistics reported between parentheses are based on robust standard errors clustered at the firm level.

[a] Statistical significance at the 1% level.
[b] Statistical significance at the 5% level.
[c] Statistical significance at the 10% level.

statistically significant coefficient for *UCF*, implying that higher cash flow levels reduce controlling shareholders' willingness to adopt poor disclosure policies, since their interests are more aligned with those of outside investors, which enhances firm transparency and consequently reduces crash risk. This result is consistent with Jin and Myers (2006), who find that firms' lack of transparency increases stock price synchronicity and leads to a higher frequency of crashes.[15]

In terms of economic significance, we compute the marginal effects of the main test variables on crash risk, where marginal effects are defined as the expected change in the probability that a firm experiences a stock price crash corresponding to an increase of one standard deviation of *Excess* (*UCF*), with all other variables in the regression held constant at their sample mean values. As shown in the last column of Table 6, a one standard deviation increase in *Excess* is associated with a 3.14% increase in stock price crash risk, indicating that the relation between the control–ownership wedge and crash risk is economically significant. In contrast, a one standard deviation increase in *UCF* decreases stock price crash risk by 5.16%.

Table 7 repeats Table 6 with only one modification: Instead of using a dummy variable as a proxy for stock price crash risk, it uses *NCRASH*, defined as the number of weeks in a fiscal year during which the firm experiences a stock price crash. We estimate an OLS regression with industry and year fixed effects. We calculate *t*-statistics based on robust standard errors clustered at the firm level. Consistent with the logistic regression results, the coefficient on *Excess* is positive and statistically significant for all cutoff levels. These findings supplement the growing literature that investigates the relation between firm opaqueness and stock price crashes (e.g., Haggard et al., 2008; Hutton et al., 2009; Kim et al., 2011b) with new evidence.

6.2. The impact of the FSL of August 1, 2003

In 2003, France passed the FSL, in the spirit of the U.S. Sarbanes–Oxley Act of 2002, aiming to restore confidence in the financial markets, particularly by enhancing transparency and improving corporate governance quality. The FSL includes a number of provisions aimed at increasing the transparency of financial statements by imposing tougher disclosure requirements.[16] Accordingly, if the

[15] The results (unreported) do not qualitatively change if we keep only one of the two variables *Excess* and *UCF*.

[16] For example, the FSL requires that all related-party transactions be disclosed and for the chairpersons of boards of directors to publish an annual report on their firm's internal control mechanisms.

Table 7
Ownership structure and stock price crash risk – Pooled OLS regressions.

Independent variable	Expected sign	Cutoff level			
		1%	2%	3%	5%
Excess	+	0.4236[b]	0.5660[b]	0.7310[a]	0.8367[a]
		(2.3044)	(2.6006)	(2.9283)	(2.8414)
UCF	–	−0.4115[b]	−0.5008[a]	−0.5289[b]	−0.6449[a]
		(−2.4628)	(−2.6166)	(−2.5689)	(−2.8771)
LEV	?	0.7379[b]	0.8621[a]	0.9627[a]	1.0216[a]
		(2.4978)	(2.9622)	(3.3125)	(3.2936)
STDRET	?	1.6477[b]	1.8534[b]	2.0266[b]	2.3333[c]
		(2.4792)	(2.1970)	(2.0291)	(1.8436)
AMIHUD	?	5.2077[a]	6.3305[a]	7.3106[a]	8.2208[a]
		(3.3283)	(3.3175)	(3.1714)	(3.0317)
ROACORR	?	0.0951[a]	0.1270[a]	0.1676[a]	0.2139[a]
		(3.9662)	(4.1983)	(4.7594)	(5.0062)
LOG (NIND)	?	0.0837[b]	0.1036[b]	0.1115[b]	0.1485[b]
		(2.5233)	(2.5400)	(2.3304)	(2.5452)
DIVERS	?	−0.0466[a]	−0.0726[a]	−0.0898[a]	−0.1083[a]
		(−2.6492)	(−3.5045)	(−3.7970)	(−3.7832)
XLIST	?	−0.0104	−0.0076	0.0295	−0.0130
		(−0.1067)	(−0.0638)	(0.2018)	(0.0707)
SIZE	?	−0.0443[b]	−0.0564[b]	−0.0711[b]	−0.0933[b]
		(−1.9925)	(−2.1679)	(−2.3540)	(−2.5827)
Intercept		0.3337[b]	0.5441[a]	0.7340[a]	1.1464[a]
		(2.2571)	(3.0933)	(3.5279)	(4.2857)
Industry dummies		Yes	Yes	Yes	Yes
Year dummies		Yes	Yes	Yes	Yes
N		4561	4561	4561	4561
Adjusted R^2		0.1823	0.1945	0.2000	0.2004
F		7.08[a]	8.42[a]	8.87[a]	9.41[a]

This table presents the results on the relationship between ownership structure and stock price crash risk for a sample of 4561 firm–year observations from 1998–2007 using pooled OLS regressions. The dependent variable (*NCRASH*) is the number of negative return outliers, defined as residual returns that exceed *k*-standard deviations of the mean weekly residual return. With *k* chosen to generate frequencies of 1%, 2%, 3% and 5% in the residual return distribution. *Excess* is a proxy for excess control. It is defined as the difference between the control and cash flow rights of the largest controlling shareholder, scaled by control rights ((*UCO* − *UCF*)/*UCO*). *UCF* is the ultimate cash flow rights of the largest controlling shareholder. Control variables include *LEV*, *STDRET*, *AMIHUD*, *ROACORR*, *LOG* (*NIND*), *DIVERS*, *XLIST* and *SIZE*. *LEV* is the financial leverage defined as book value of total liabilities divided by total assets (all at the beginning of the year). *STDRET* is the standard deviation of the firm's daily stock returns in year *t*. *AMIHUD* is the Amihud's (2002) price impact ratio, defined as the yearly average ratio of daily absolute returns to the daily trading volume in monetary terms. *ROACORR* is the Spearman correlation between the firm's return on assets and its industry average return on assets over the past five years, including year *t*. *LOG* (*NIND*) is the natural logarithm of the average number of firms (in the industry to which the firm belongs) that were used to calculate the weekly industry return index. *DIVERS* measures firm diversification and is calculated as the number of four-digit SIC code industries in which the firm operates. *XLIST* is a dummy variable that takes the value of one if the firm has ADRs traded in the United States and zero otherwise. *SIZE* is computed as the natural logarithm of market capitalization at the end of the year. Industry (using Campbell's (1996) industrial classification) and year dummies are also included in the regressions. The *t*-statistics reported between parentheses are based on robust standard errors clustered at the firm level.

[a] Statistical significance at the 1% level.
[b] Statistical significance at the 5% level.
[c] Statistical significance at the 10% level.

passage of the FSL improves firms' information environment, then stock prices should incorporate more firm-specific information, resulting in lower synchronicity in the post-FSL period.

We replicate the results of Table 4, using two additional explanatory variables: a dummy variable (*FSL*) that equals one for post-2002 years and zero otherwise and a variable interacting *FSL* with *Excess*. Table 8 reports the results. The coefficient of *FSL* is negative (−0.1527) and statistically significant at the 1% level, implying that the adoption of the FSL has fostered the incorporation of firm-specific information into stock prices. More interestingly, the coefficient of the interaction term (*Excess* × *FSL*) is negative (−0.0443) and highly significant, indicating that the introduction of the FSL was effective in constraining controlling shareholders' self-serving actions, subsequently increasing the availability of firm-specific information and leading to lower stock price synchronicity.

6.3. Product market competition

Product market competition is regarded as a powerful external corporate governance mechanism. We investigate the impact of product market competition on the relationship between ownership structure and stock price synchronicity. To examine this issue, we first compute the sales-based Herfindahl–Hirschman index (*HHI*), using two-digit SIC code industry groupings. Then, we classify firms into two groups, depending upon whether they operate in a low-competition (above-median *HHI*) or a high-competition (below-median *HHI*) industry. Finally, we test whether stock price synchronicity is significantly different between the low- and high-competition groups by running a joint seemingly unrelated regression estimation. We compute *t*-statistics based on robust standard errors clustered at the firm level. The results reported in Table 9 reveal that the coefficients of *Excess* are positive and significant for both low and high product market competition groups. Moreover, χ^2 has a value of 3.29 and is significant at the 10% level, implying that the relationship between the control–ownership wedge and stock price synchronicity differs between low- and high-competition groups. More importantly, we find that the effect of the control–ownership wedge is more pronounced for firms that operate in high-competition industries. This suggests that controlling shareholders are more inclined to limit the flow of firm-specific information when they face higher competitive pressure from the product market, since they do so to conceal their private

Table 8
The effect of the Financial Security Law of 2003.

Independent variable	
Excess	0.4823[a]
	(3.5399)
FSL	−0.1527[a]
	(−2.8749)
Excess × *FSL*	−0.0443[a]
	(−3.7373)
UCF	−0.6078[a]
	(−5.6364)
LEV	−0.0883
	(−0.6451)
STDRET	−0.3870[a]
	(−2.7840)
AMIHUD	1.5560[a]
	(3.4601)
ROACORR	0.0541[b]
	(2.2753)
LOG (*NIND*)	−0.2099[a]
	(−5.7528)
DIVERS	0.0216
	(1.5703)
XLIST	0.4403[a]
	(3.3579)
SIZE	0.2955[a]
	(18.8825)
Intercept	−1.0404[a]
	(−3.6337)
Industry dummies	Yes
Year dummies	Yes
N	4561
Adjusted R^2	0.4494
F	36.52[a]

This table reports regression estimates of the effect of the 2003 Financial Security Law on stock price synchronicity. The sample contains 4561 firm–year observations from 1998 to 2007. *Excess* is a proxy for excess control. It is defined as the difference between the control and cash flow rights of the largest controlling shareholder, scaled by control rights ((*UCO* − *UCF*)/*UCO*). *UCF* is the ultimate cash flow rights of the largest controlling shareholder. We include a dummy variable, *FSL*, equal to one for post-2002 years and zero otherwise as well as an interaction term of *FSL* dummy and the excess control variable. Control variables include *LEV*, *STDRET*, *AMIHUD*, *ROACORR*, *LOG* (*NIND*), *DIVERS*, *XLIST*, *AMIHUD* and *SIZE*. *LEV* is the financial leverage defined as book value of total liabilities divided by total assets (all at the beginning of the year). *STDRET* is the standard deviation of the firm's daily stock returns in year *t*. *AMIHUD* is the Amihud's (2002) price impact ratio, defined as the yearly average ratio of daily absolute returns to the daily trading volume in monetary terms. *ROACORR* is the Spearman correlation between the firm's return on assets and its industry average return on assets over the past five years, including year *t*. *LOG* (*NIND*) is the natural logarithm of the average number of firms (in the industry to which the firm belongs) that were used to calculate the weekly industry return index. *DIVERS* measures firm diversification and is calculated as the number of four-digit SIC code industries in which the firm operates. *XLIST* is a dummy variable that takes the value of one if the firm has ADRs traded in the United States and zero otherwise. *SIZE* is computed as the natural logarithm of market capitalization at the end of the year. Industry (using Campbell's (1996) industrial classification) and year dummies are also included in the regressions. The *t*-statistics reported between parentheses below the estimated coefficients are based on standard errors clustered at the firm level.

[a] Statistical significance at the 1% level.
[b] Statistical significance at the 5% level.
[c] Statistical significance at the 10% level.

Table 9
The effect of product market competition.

Independent variable	Product market competition	
	Low	High
Excess	0.2802[c]	0.6072[a]
	(1.7409)	(3.2626)
UCF	−0.5921[a]	−0.5780[a]
	(−3.9067)	(−3.9297)
LEV	−0.3065	0.0927
	(−1.4047)	(0.5792)
STDRET	−0.4906[a]	−0.3368[a]
	(−2.8700)	(−3.0997)
AMIHUD	1.6330[b]	1.3251
	(2.3329)	(0.9507)
ROACORR	0.0157	0.0937[a]
	(0.4768)	(2.7403)
LOG (*NIND*)	−0.2040[a]	−0.2122[a]
	(−4.4438)	(−4.4322)
DIVERS	0.0045	0.0346[c]
	(0.2479)	(1.8049)
XLIST	0.3207[c]	0.6104[a]
	(1.8532)	(3.5305)
SIZE	0.3549[a]	0.2427[a]
	(15.7672)	(12.0667)
Intercept	−0.9837[a]	−0.6054[a]
	(−3.4521)	(−2.8350)
Industry dummies	Yes	Yes
Year dummies	Yes	Yes
N	2211	2350
Adjusted R^2	0.5111	0.4063
F	24.38[a]	24.00[a]
Subsample comparison of coefficients on *Excess*	χ^2 = 3.29[c] (*p*-value = 0.0697)	

This table summarizes the results of the subsample analysis of the effect of product market competition on stock price synchronicity. We gauge product market competition using the revenue-based Herfindahl–Hirschman index of industry-level concentration based on two-digit SIC code industrial groupings. The sample is split into two subsamples: firms with low (above the median) Herfindahl–Hirschman indexes and firms with high (below the median) Herfindahl–Hirschman indexes. The sample contains 4561 firm–year observations from 1998 to 2007. *Excess* is a proxy for excess control. It is defined as the difference between the control and cash flow rights of the largest controlling shareholder, scaled by control rights ((*UCO* − *UCF*)/*UCO*). *UCF* is the ultimate cash flow rights of the largest controlling shareholder. Control variables include *LEV*, *STDRET*, *AMIHUD*, *ROACORR*, *LOG* (*NIND*), *DIVERS*, *XLIST* and *SIZE*. *LEV* is the financial leverage defined as book value of total liabilities divided by total assets (all at the beginning of the year). *STDRET* is the standard deviation of the firm's daily stock returns in year *t*. *AMIHUD* is the Amihud's (2002) price impact ratio, defined as the yearly average ratio of daily absolute returns to the daily trading volume in monetary terms. *ROACORR* is the Spearman correlation between the firm's return on assets and its industry average return on assets over the past five years, including year *t*. *LOG* (*NIND*) is the natural logarithm of the average number of firms (in the industry to which the firm belongs) that were used to calculate the weekly industry return index. *DIVERS* measures firm diversification and is calculated as the number of four-digit SIC code industries in which the firm operates. *XLIST* is a dummy variable that takes the value of one if the firm has ADRs traded in the United States and zero otherwise. *SIZE* is computed as the natural logarithm of market capitalization at the end of the year. Industry (using Campbell's (1996) industrial classification) and year dummies are also included in the regressions. The *t*-statistics reported in parentheses are based on standard errors clustered at the firm level.

[a] Statistical significance at the 1% level.
[b] Statistical significance at the 5% level.
[c] Statistical significance at the 10% level.

benefits and thus avoid disciplinary actions if their opportunistic behavior is detected. Leuz and Wysocki (2008) argue that when the competitive threat is high, disclosing more proprietary information limits insiders' ability to extract private benefits. Consequently, controlling shareholders are more likely to prevent the disclosure of relevant information to competitors. This is consistent with the theoretical predictions of Gertner et al. (1988), who demonstrate that firms in more competitive industries are more likely to engage in misreporting and tend to have less informative disclosure policies.

7. Robustness checks

In this section we check the reliability of our results by performing several sensitivity tests. First, we rerun our regressions using a more stringent sample selection criterion, requiring firms to have a minimum of 51 weeks of observations per year instead of 30. The results remain qualitatively the same (see Table 10, Eq. (1)).

Second, we replicate our regressions after eliminating firms controlled through a pyramid. Holding a firm through successive

Table 10
Robustness checks.

Independent variable	Eq. (1) requiring 51 weeks of observations	Eq. (2) excluding pyramid firms	Eq. (3) excluding forty largest capitalizations	Eq. (4) excluding 1998 and 2007	Eq. (5) using 20% control threshold	Eq. (6) excluding widely held firms	Eq. (7) including *STDROA*	Eq. (8) including *TURNOVER*	Eq. (9) including skewness and kurtosis
Excess	0.4393[a]	0.5077[b]	0.7105[a]	0.4720[a]	0.4289[a]	0.8432[a]	0.4354[a]	0.4712[a]	0.4600[a]
	(3.1419)	(2.1770)	(4.9079)	(3.2143)	(3.0096)	(5.6416)	(3.2598)	(3.4717)	(3.4319)
UCF	−0.6356[a]	−0.6454[a]	−0.3611[a]	−0.6339[a]	−0.6573[a]	−0.2580[a]	−0.6361[a]	−0.5526[a]	−0.5964[a]
	(−5.7679)	(−5.6975)	(−3.5802)	(−5.4682)	(−6.3326)	(−3.2506)	(−6.0406)	(−5.0899)	(−5.5725)
LEV	−0.0763	−0.2942[c]	−0.1428	−0.0904	−0.1008	−0.0626	−0.0569	−0.1018	−0.0922
	(−0.5425)	(−1.8734)	(−1.0643)	(−0.6370)	(−0.7328)	(−0.4401)	(−0.4119)	(−0.7488)	(−0.6734)
STDROA							−0.0178[a]		
							(−6.8921)		
STDRET	−0.3840[a]	−0.2710[a]	−0.3182[a]	−0.3380[a]	−0.3816[a]	−0.3556[a]		−0.3074[b]	−0.2811[a]
	(−2.8108)	(−3.0235)	(−2.7831)	(−2.9292)	(−2.7664)	(−2.7704)		(−2.1082)	(−3.7638)
AMIHUD	1.5909[a]	2.0037[b]	0.9246[b]	1.4225[a]	1.5660[a]	1.4991[a]	1.7352[a]		1.6714[a]
	(3.4989)	(2.5604)	(2.0481)	(2.9916)	(3.4493)	(3.3549)	(3.9224)		(3.5848)
TURNOVER × 10^2								0.1275[b]	
								(2.3571)	
ROACORR	0.0509[b]	0.0331	0.0420[c]	0.0444[c]	0.0560[c]	0.0471[b]	0.0742[b]	0.0562[b]	0.0575[b]
	(2.0929)	(1.1746)	(1.8571)	(1.7620)	(2.3313)	(1.9920)	(3.0888)	(2.3427)	(2.4270)
LOG (NIND)	−0.2089[a]	−0.2072[a]	−0.2129[a]	−0.2124[a]	−0.2119[a]	−0.2087[a]	−0.1949[a]	−0.2099[a]	−0.2090[a]
	(−5.6202)	(−4.9725)	(−5.5755)	(−5.7551)	(−5.7288)	(−5.5176)	(−5.3338)	(−5.7836)	(−5.7812)
DIVERS	0.0185	0.0114	0.0074	0.0130	0.0230[c]	0.0160	0.0113	0.0203	0.0180
	(1.3075)	(0.7247)	(0.5493)	(0.8733)	(1.6597)	(1.1994)	(0.8325)	(1.4570)	(1.3291)
XLIST	0.4438[a]	0.5970[a]	0.1409	0.4593[a]	0.4540[a]	0.2401[c]	0.3984[a]	0.4300[a]	0.4121[a]
	(3.3447)	(3.7990)	(1.1542)	(3.3593)	(3.4965)	(1.8085)	(3.1806)	(3.2566)	(3.1776)
SIZE	0.2975[a]	0.3070[a]	0.2454[a]	0.2925[a]	0.2969[a]	0.2840[a]	0.3054[a]	0.2804[a]	0.3005[a]
	(18.3745)	(16.4684)	(14.4327)	(17.8764)	(18.9444)	(17.0430)	(19.9098)	(17.8669)	(19.5609)
SKEWNESS									−0.0682[a]
									(−4.5899)
KURTOSIS									−0.0171[a]
									(−4.5342)
Intercept	−1.0112[a]	−0.9810[a]	−1.1317[a]	−1.2278[a]	−1.0184[a]	−1.3840[a]	−0.9730[a]	−1.0584[a]	−0.9665[a]
	(−3.4107)	(−3.5685)	(−6.2355)	(−3.8493)	(−3.6198)	(−7.3924)	(−3.5381)	(−3.8852)	(−3.3185)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	4414	3146	4319	3650	4561	4342	4561	4561	4561
Adjusted R^2	0.4533	0.4790	0.3077	0.4483	0.4472	0.3978	0.4591	0.4488	0.4567
F	36.62[a]	28.67[a]	24.96[a]	36.97[a]	35.87[a]	31.00[a]	39.54[a]	37.07[a]	36.63[a]

This table provides results of robustness analyses. The sample contains 4561 firm–year observations from 1998 to 2007. The first equation requires firms to have at least 51 weeks of observations to be included in the sample. The second, third and fourth equations exclude pyramid firms, the forty largest capitalizations and the particular years 1998 and 2007, respectively. The fifth equation uses the 20% control threshold to define the controlling shareholder of the firm. The sixth equation excludes widely held firms. The seventh and eighth equations include *STDROA* and *TURNOVER* as alternative proxies for *STDRET* and *AMIHUD*, respectively. The last equation includes the skewness and kurtosis of residual returns obtained from the market model regression as additional explanatory variables. *Excess* is a proxy for excess control. It is defined as the difference between the control and cash flow rights of the largest controlling shareholder, scaled by control rights ((*UCO* − *UCF*)/UCO). *UCF* is the ultimate cash flow rights of the largest controlling shareholder. Control variables include *LEV*, *STDRET*, *AMIHUD*, *ROACORR*, *LOG* (*NIND*), *DIVERS*, *XLIST* and *SIZE*. *LEV* is the financial leverage defined as book value of total liabilities divided by total assets (all at the beginning of the year). *STDROA* is the standard deviation of returns on assets measured over five years including and preceding year *t*. *STDRET* is the standard deviation of the firm's daily stock returns in year *t*. *AMIHUD* is the Amihud's (2002) price impact ratio, defined as the yearly average ratio of daily absolute returns to the daily trading volume in monetary terms. *TURNOVER* is the yearly average ratio of daily share trading volume divided by the number of shares outstanding. *ROACORR* is the Spearman correlation between the firm's return on assets and its industry average return on assets over the past five years, including year *t*. *LOG* (*NIND*) is the natural logarithm of the average number of firms (in the industry to which the firm belongs) that were used to calculate the weekly industry return index. *DIVERS* measures firm diversification and is calculated as the number of four-digit SIC code industries in which the firm operates. *XLIST* is a dummy variable that takes the value of one if the firm has ADRs traded in the United States and zero otherwise. *SIZE* is computed as the natural logarithm of market capitalization at the end of the year. Industry (using Campbell's (1996) industrial classification) and year dummies are also included in the regressions. The *t*-statistics reported in parentheses are based on standard errors clustered at the firm level.

[a] Statistical significance at the 1% level.
[b] Statistical significance at the 5% level.
[c] Statistical significance at the 10% level.

control tiers dramatically enhances the separation of control and cash flow rights, which gives the ultimate owners, at the apex of the pyramid, higher incentives to extract private benefits of control. Moreover, pyramid firms tend to be more opaque since information has to travel from the bottom to the top of the pyramid through several layers and managers at each intermediate layer, constrained by their own conflicts of interest, may not provide timely or accurate disclosures (Fan et al., 2011). Consequently, pyramid firms are perceived to display higher stock price synchronicity and their presence can therefore unduly influence our results. Eq. (2) of Table 10 shows that the inferences remain unchanged and that our results are not driven by pyramid-affiliated firms.

Third, since market indexes are computed based on firm market capitalization, the correlation between a given firm's returns and market returns may be driven by the presence of large firms. Although concern over the influence of the presence of large firms is mitigated, given that our sample includes a large number of firms, we rerun our regressions after excluding the 40 firms with the largest capitalization. The results (see Table 10, Eq. (3)) remain qualitatively similar.

Fourth, we exclude 1998 and 2007 from our tests to avoid potential bias that can arise from the unusual price movements during these years of financial downturn. The conclusions remain unaffected (see Table 10, Eq. (4)).

Fifth, although several empirical studies argue that using a 10% or 20% control cutoff is sufficient to define controlled firms, some studies document that control thresholds matter. For instance, Faccio et al. (2001) find that tightly affiliated firms (i.e., all control links are at least equal to 20% of control rights) face greater agency conflicts between controlling and minority shareholders and consequently pay higher dividends to allay expropriation concerns. Conversely, the authors document that loosely affiliated firms (i.e., all control links exceed 10% but not 20% of control rights) pay significantly lower dividends. We expect this to be a problem of limited importance because the use of a tighter threshold reduces our sample of controlled firms by only a few observations. Nevertheless, we repeat our regressions using the 20% control cutoff. Eq. (5) of Table 10 shows that the coefficients of *Excess* and *UCF* have the expected signs and are significant at the 1% level, providing further reassurance that our results are not marred by the choice of control threshold.

Sixth, we conduct a sensitivity analysis of our results to the use of alternative proxies for some of our control variables. More specifically, we use the standard deviation of return on assets instead of that of stock returns to measure return volatility (see Eq. (7) of Table 10) and use turnover rather than Amihud's (2002) price impact ratio to proxy for stock liquidity (see Eq. (8) of Table 10). The empirical results show that our conclusions are robust to the use of alternative proxies.

Finally, to assuage the concern that our results are unduly influenced by the distributional properties of residual returns, we follow Jin and Myers (2006) and include the skewness and kurtosis of residual returns as additional control variables. We continue to find results consistent with those reported for our primary analyses (see Table 10, Eq. (9)).

8. Conclusion

This study investigates the effect of controlling shareholders on stock price synchronicity in a sample of 654 French firms from 1998 to 2007. It provides strong evidence that the separation of control and cash flow rights is positively associated with the amount of industry- and market-level information incorporated into stock prices. This finding is consistent with the prediction that the control–ownership wedge gives controlling shareholders incentives to limit the flow of firm-specific information to the market to keep any opportunistic behavior outside the glare of external scrutiny. Additionally, our empirical findings show that a firm with substantial control–ownership wedge is more prone to crashes, which is consistent with the notion that controlling shareholders are able to hide information only up to a certain threshold, upon which all bad news is suddenly disclosed. Another important finding relates to the effect of cash flow concentration on stock price synchronicity and crash risk. We find that stock prices are less synchronous and less likely to crash when controlling shareholders own a large fraction of cash flow rights. This is consistent with the argument that concentrated ownership improves the firm's informational environment and facilitates the dissemination of firm-specific information to the market. Taken together, our results support the findings of Jin and Myers (2006) and Hutton et al. (2009), who document that high firm opaqueness is associated with both more synchronous stock price movements and higher crash frequencies.

Overall, the findings of this paper support our hypotheses and are shown to be robust to the use of different regression specifications and alternative proxies of key variables. They provide evidence of the importance of corporate ownership structure in explaining the behavior of stock returns and thus contribute to better understanding the role of corporate governance in concentrated ownership environments.

Appendix A. Variables definitions

Variable	Definition
A. Information flow variables	
R^2	The coefficient of determination from the firm–year estimation of the model: $RET_{i,w} = \alpha + \beta_1 MKRET_{w-1} + \beta_2 MKRET_w + \beta_3 INDRET_{i,w-1} + \beta_4 INDRET_{i,w} + \varepsilon_{i,w}$ where *MKRET* is the value-weighted market (based on the SBF 250 market index) return and *INDRET* is the two-digit SIC industry value-weighted return for week t with firm i being discarded.
SYNCH	Logarithmic transformation of R^2, defined as $\log(R^2/(1-R^2))$.
CRASH	This dummy variable equals one if the firm exhibits within its fiscal year one or more weekly residual returns falling k standard deviations below the mean weekly residual return for the entire fiscal year and zero otherwise, with k chosen to generate frequencies of 1%, 2%, 3%, and 5% in the residual return distribution.
NCRASH	The number of weeks in a fiscal year during which the firm experiences a stock price crash.
B. Ownership structure variables	
UCF	The ultimate cash flow rights of the largest controlling shareholder.
UCO	The ultimate control rights of the largest controlling shareholder.
Excess	A proxy for excess control defined as the difference between the control and cash flow rights of the largest controlling shareholder, scaled by control rights $((UCO - UCF)/UCO)$.

(*continued on next page*)

Appendix A. (*continued*)

Variable	Definition
ExcessDiff	The difference between the control rights (*UCO*) and cash flow rights (*UCF*) of the largest controlling shareholder.
ExcessDummy	A dummy variable equal to one if control rights (*UCO*) exceed cash flow rights (*UCF*) and zero otherwise.
ExcessHigh	A dummy variable equal to one if *Excess* is higher than the median excess control in firms where control (*UCO*) is higher than ownership (*UCF*) and zero otherwise.
C. Other variables	
LEV	Financial leverage, defined as the book value of total liabilities divided by total assets (all at the beginning of the year).
STDRET	The standard deviation of the firm's daily stock returns over the current fiscal year.
AMIHUD	Amihud's (2002) price impact ratio, defined as the yearly average ratio of daily absolute returns to the daily trading volume in monetary terms.
ROACORR	The Spearman correlation between the firm's return on assets and its industry average return on assets over the past five years, including year *t*.
DIVERS	The number of four-digit SIC code industries in which the firm operates.
XLIST	A dummy variable that takes the value of one if the firm has ADRs traded in the United States that require reconciliation to U.S. Generally Accepted Accounting Principles and zero otherwise.
SIZE	The natural logarithm of market capitalization at the end of the year.
NIND	The average number of firms (in the industry to which the firm belongs) that were used to calculate the weekly industry return index.
SKEWNESS	The skewness of residual returns over the fiscal year.
KURTOSIS	The kurtosis of residual returns over the fiscal year.
FSL	A dummy variable equal to one for post-2002 years and zero otherwise.

Appendix B. Computation method of ownership and control variables

See Figs. 1 and 2.

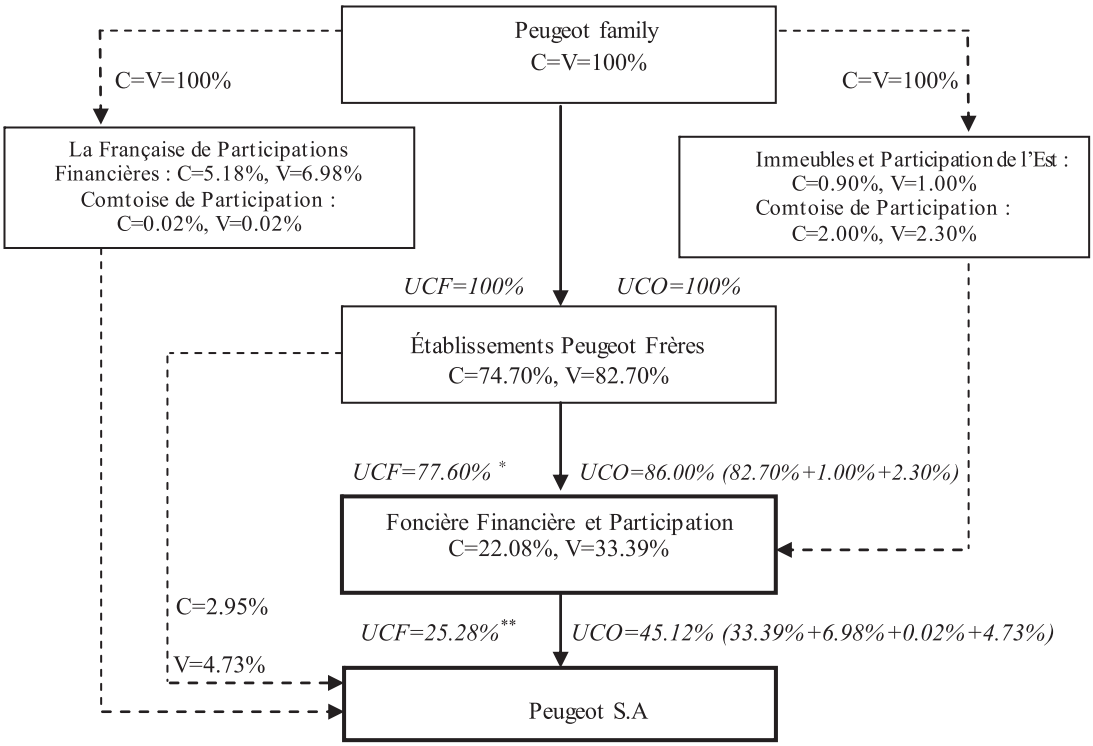

Fig. 1. Peugeot S.A. This figure describes major listed firms controlled by Peugeot family. All control stakes are reported. Hard lines denote the main control chain. Dotted lines denote other control chains. Firms in thick boxes are publicly-traded firms. "C" and "V" denote direct cash flow stakes and direct voting stakes, respectively. Direct ownership (C) and voting (V) stakes are shown in each firm's box, while the Peugeot family's ultimate cash flow (*UCF*) and control (*UCO*) stakes are shown in *italics* alongside each arrow. We trace the ownership of *Peugeot S.A.* back to the ultimate owner. *Foncière Financière et Participation* directly controls *Peugeot S.A.* (C = 22.08%, V = 33.39%) and is itself controlled directly by *Établissements Peugeot Frères* (C = 74.7%, V = 82.7%) and indirectly by Peugeot family through two wholly-owned firms: *Immeubles et Participations de l'Est* (C = 0.9%, V = 1%) and *Comtoise de Participation* (C = 2%, V = 2.3%). Peugeot family also controls *Peugeot S.A.* indirectly through three wholly-owned firms: *Établissement Peugeot Frères* (C = 2.95%, V = 4.73%), La *Française de Participations Financières* (C = 5.18%, V = 6.98%) and *Comtoise de Participation* (C = 0.02%, V = 0.02%).The ultimate cash flow stake (at the 10% threshold) held by Peugeot family in *Peugeot S.A.* is computed as the sum of the products of ownership stakes along the different control chains. It equals [100% × (74.70% + 0.90% + 2.00%) × 22.08% + 100% × (5.18% + 0.02% + 2.95%)] = 25.28%. The Peugeot family's ultimate control stake (at the 10% threshold) is the sum of the weakest links along each control chain. The weakest link in the pyramidal chain is min (100%; 86.00%; 45.12%) = 45.12%. The excess control ((*UCO* − *UCF*)/*UCO*) of *Peugeot S.A.* in 2006 equals 43.97%. *100% × (74.70% + 0.90% + 2.00%) = 77.60%. **100% × (74.70% + 0.90% + 2.00%) × 22.08% + 100% × (5.18% + 0.02% + 2.95%) = 25.28%.

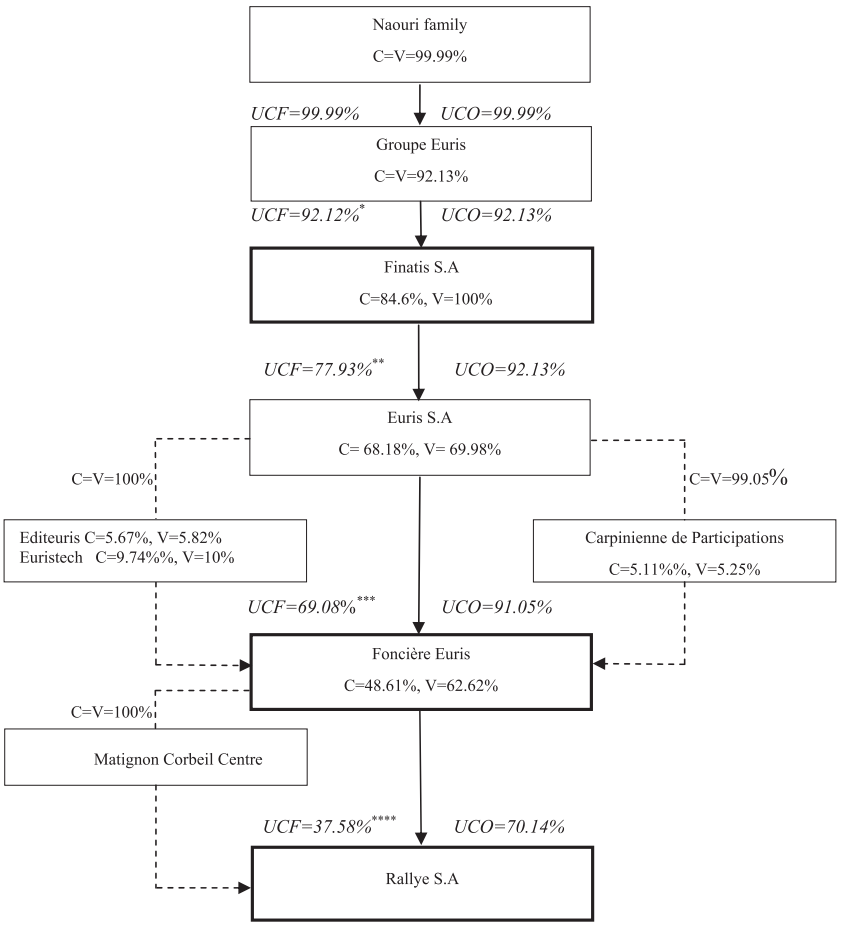

Fig. 2. Rallye S.A. This figure describes the ownership and control structure of the major listed firms controlled by *Naouri family*. All control stakes are reported. Hard lines denote the main control chain. Dotted lines denote other control chains. Firms in thick boxes are publicly-traded firms. "C" and "V" denote direct cash flow stakes and direct voting stakes, respectively. Direct ownership (C) and voting (V) stakes are shown in each firm's box, while the Naouri family's ultimate cash flow (*UCF*) and control (*UCO*) stakes are shown in *italics* alongside each arrow. The direct largest shareholder of *Rallye S.A.* is *Foncière Euris*, which holds directly (indirectly through the wholly owned company *Matignon Corbeil Centre*) 48.61% (5.79%) of direct cash flow stakes and 62.62% (7.52%) of direct voting stakes. *Foncière Euris* itself is controlled by *Euris S.A.* both directly (C = 68.18%, V = 69.98%) and indirectly through two wholly owned companies (*Editeuris* (C = 5.67%, V = 5.82%) and *Euristech* (C = 9.74%, V = 10%)). *Euris S.A.* also controls *Carpinienne de Participation* (C = V = 99.05%) that holds a minority stake in *Foncière Euris* (C = 5.11%, V = 5.25%)). *Finatis S.A.* controls *Euris S.A.* (C = 84.6%, V = 100%) and is itself controlled by *Groupe Euris* (C = V = 92.13%), which is controlled in turn by *Naouri family* (C = V = 99.99%). The ultimate cash flow stake held by *Naouri family* in *Rallye S.A.* (at the 10% threshold) is computed as the sum of the products of ownership stakes along the different control chains and equals 37.58% = [99.99% × 92.13% × 84.6% × (100% × (5.67% + 9.74%) + 99.05% × 5.11% + 68.18%) × (100% × 5.79% + 48.61%)]. The Naouri family's ultimate control stake (at the 10% threshold) is the sum of the weakest links along each control chain. The weakest link in the pyramidal chain is min (99.99%; 92.13%; 91.05%; 70.14%) = 70.14%. The excess control ((*UCO* − *UCF*)/*UCO*) of *Rallye S.A.* in 2006 equals 46.42%. * 99.99% × 92.13% = 92.12%. ** 99.99% × 92.13% × 84.60% = 77.93%. *** 99.99% × 92.13% × 84.60% × (100% × (5.67% + 9.74%) + 99.05% × 5.11%) + 68.18% = 69.08%. **** 99.99% × 92.13% × 84.60% × (100% × (5.67% + 9.74%) + 99.05% × 5.11% + 68.18%) × (100% × 5.79% + 48.61%) = 37.58%.

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