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Shareholder composition, share turnover, and returns in volatile markets: The case of international REITs

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A B S T R A C T

The shareholder composition of listed property companies has changed from the fragmented, retail ownership, to more concentrated, institutional ownership over the past decade. In this paper, we first document significant variation in the composition of the shareholder base across the world's five largest listed property markets. We then examine the relation between the composition of the shareholder base and stock market performance and share turnover during the turbulent trading days of 2008 and 2009. By directly relating the shareholder base of firms to excess returns and turnover on these volatile days, we are able to isolate the importance of shareholder composition during periods when trading behavior is most likely to vary across different types of shareholders. We find that both large block holdings and high levels of institutional ownership decrease trading volumes and moderate stock returns; however, the effects largely occur when stock prices move sharply downward. Moreover, these effects are strongest when ownership concentration and institutional ownership exceed 25 percent. We also find that the disaggregation of institutional investors into distinct categories (banks, pension funds, advisors, etc.) increases our understanding of stock trading and share price dynamics of listed property companies.

1. Introduction

Over the last three decades, public real estate markets around the world have matured into an asset class that provides investors the opportunity to increase their exposure to commercial real estate without the burden of acquiring, managing, and disposing of direct property investments in far-away

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countries with unfamiliar legal, political, and market structures. Commensurate with growth in the stock market capitalization of public-traded property companies has been an increase in the institutional ownership of property shares. At the end of 2009, institutional investors and company insiders held around 60 percent of U.S. Real Estate Investment Trust (REIT) shares, up sharply from the late 1990s when institutions and insiders owned approximately 40 percent of outstanding U.S. REIT shares. In addition, some private investors have evolved into large block holders who possess significant ownership stakes in the company. Large block holdings by insiders reduce the free float of listed shares and may thereby influence the returns and volatility of property shares.

The reduced interest in public real estate companies among non-institutional investors is thought to be related to dividend policies and share price volatility. For example, dividend yields on U.S. equity REITs averaged 7.4 percent from 1990 to 2002. However, by the end of 2009 the average dividend yield had declined to 3.7 percent. In fact, common shareholders witnessed approximately 60 U.S. REITs cut or suspend dividends during 2008 and 2009 (Case et al., 2012). In addition, the share price volatility of public real estate companies has increased dramatically in recent years. The Dow Jones Equity All REIT Index registered a larger than five percent increase or decrease just three times from 1990 through the end of 2007. However, a daily swing of at least that magnitude occurred 64 times from September 2008 through March of 2009. Similar share price volatility has occurred in Asian and European public real estate markets. Despite the exit of many individual shareholders from public real estate markets, some company executives have indicated a preference for increased ownership of their stock by individual (retail) investors. For example, Leo Ullman, chief executive of U.S. mall owner Cedar Shopping Centers Inc. has stated that he "would love to see more retail because I think it's more consistent ownership and potentially less dislocative when people decide to get out" (Troianovski, 2010).

The composition of the shareholder base and its effects on stock prices has received increased attention in the general finance literature in recent years. For example, Sias and Starks (1997) and Nofsinger and Sias (1999) examine the impact of aggregate institutional ownership on share prices. However, Dennis and Strickland (2002) and Hotchkiss and Strickland (2003) were the first to focus on firm level variation in the composition of institutional investors, arguing that the investment goals and trading behavior of hedge funds, investment advisors, pension funds, and other shareholder types can vary considerably. Nevertheless, little is known about the composition of shareholders among publicly traded real estate companies or its influence on return performance and trading volume.

In this paper, we first document how the composition of the shareholder base varies across the world's five largest listed property markets: Australia, France, Japan, the U.K. and the U.S. We then examine the relation between the composition of the shareholder base, stock market performance, and share turnover of public real estate companies during the turbulent stock market years of 2008 and 2009. International real estate markets offer an interesting setting in which to analyze whether differences in regulatory, political, and market environments affect shareholder composition and whether such differences are related to abnormal returns and share turnover during volatile markets.

Our study adds to the literature in several ways. First, we extend the analysis of the shareholder base beyond the U.S. market. This is important because property markets outside of the U.S. now make up more than 70 percent of global market capitalization. It is also likely that U.S. regulations regarding REIT stock ownership hamper the generalization of U.S. results to other countries. Second, the Reuters/Thomson data we employ allows us to identify a larger set of shareholders than previous studies, including individuals and corporations. Our ability to categorize a larger percentage of the shareholder base is potentially important given, for example, the surge in hedge fund activity in public markets in recent years and the decline in ownership among retail investors. Third, we examine firm-level abnormal returns and share turnover on the 76 trading days during 2008 and 2009 in which the general stock market index in one or more of our five countries produced a return that exceeded its prior three-year average by more than two standard deviations. By directly relating the shareholder base of firms to their stock market performance and share turnover on these extreme event days, we are able to isolate the importance of shareholder composition during periods of extreme market volatility when trading behavior is most likely to vary across the shareholder base.

Our regression results support the contention that the cross-section of excess returns and share turnover on extreme return days is related to the composition of a public real estate company's shareholder base. However, the composition of the investor base is substantially more important on days in

which the general stock market in a country experiences an extreme decline. In particular, the returns of listed property companies are higher on extreme down days if the ownership stake of the largest shareholder is large; this is especially true if the largest stakeholder owns more than 25 percent of outstanding shares. Returns are also less negative on extreme down days if the stake of institutional investors is larger. Again, the positive effect of institutional ownership on stock prices in down markets is more pronounced when institutional investors hold more than 25 percent of outstanding shares. Moreover, the importance of institutional holdings is strongest in the U.S., where institutional ownership is greatest. Regarding excessive share turnover, we find that abnormal turnover among listed property companies is significantly lower on extreme down days if the ownership stake of the largest shareholder is large and/or if the ownership share of institutional investors is high; this dampening of turnover on extreme down days is especially pronounced among firms with institutional ownership greater than 25 percent.

The paper proceeds as follows. In Section 2, we review the extant literature on ownership structure. In Section 3, we present and discuss our shareholder composition data, the selection of extreme event days, and summary statistics. We describe our empirical methodology in Section 4, including our excess return and share turnover regressions on extreme event days. Section 5 discusses our empirical results. We conclude with a brief summary of our methodology and empirical results.

2. Ownership structure literature

Over the past century, the ownership structure of listed companies has generally evolved from closely-held to widely dispersed, in which no individual or single group has the necessary resources to own a controlling interest (Holderness, 2003). As a result of this evolution, firms faced "the dissolution of the old atom of ownership into its component parts, control and beneficial ownership" (Berle and Means, 1932). The trend toward a dispersed ownership structure has generated a large body of research, highlighting potential agency problems in diffusely held corporations (*e.g.*, Jensen and Meckling, 1976). Moreover, the *identity* of shareholders appears to play an important role in agency conflicts between managers and shareholders. For instance, the monitoring role of institutional investors and its effects on managerial decisions is ambiguous. The efficient monitoring hypothesis, which states that institutional investors are more informed and better able to monitor management at a lower cost than retail shareholders, is supported by Brickley et al. (1988). However, the conflict of interest or strategic alignment hypothesis, which is based on strategic cooperation between managers and institutional investors which exploits small investors, is also supported (see for example, Black, 1992 and Pound, 1988).

The literature on the influence of large blockholders on firm performance does not provide consistent findings. According to Holderness (2003), pronounced ownership concentrations can be motivated by two factors: the shared benefits of control that accrue to all shareholders, no matter their size; and the private benefits that accrue solely to the blockholders. Although most event studies document positive CARs when blockholders obtain a large stake in a company (*e.g.,* Barclay and Holderness, 1991), relatively few studies have found a relation between ownership concentration and operating performance or firm value (*e.g.,* McConnell and Servaes, 1995; Mehran, 1995). In more recent work, several authors have been exploring differences in the trading behavior of retail and institutional investors. For example, Sharma et al. (2008) show that over the period 1980 to 2004 institutional investors were net buyers of growth stocks and net sellers of value stocks; in contrast, retail investors were buying value stocks and selling glamor stocks. Hur et al. (2010) find that stocks with greater retail investor stakes suffer more from disposition effect-induced momentum. In other words, these stocks are held too long by their retail investors when their stock prices are declining. Finally, Dasgupta et al. (2011) find that institutional stockholders tend to herd together when buying and selling, and that this herding behavior predicts short-term returns.

The empirical relation between ownership structures and non-stock return performance proxies, such as firm value and operating performance, is not conclusive. Demsetz and Villalonga (2001) provide a summary of the studies conducted on ownership structures and conclude that the available empirical evidence does indicate a significant and consistent relation between the shareholder base and financial performance. Demsetz and Villalonga (2001) argue that the inconclusive prior findings are attributable to: the proxy used for performance, the method used to define and measure share ownership, and whether variable endogeneity has been taken into account in the empirical tests. Demsetz and Villalonga (2001) support the view that the market succeeds in bringing forth optimal

ownership structures. More specifically, they conclude that ownership structures differ across firms because of differences in the circumstances facing firms. Moreover, if ownership structures are the outcomes of competitive markets for corporate control, a systematic relationship between firm performance and ownership structure would not be observed.

If competitive markets for corporate control eliminate the link between ownership composition and performance, the listed real estate sector offers a unique setting in which to test this hypothesis because regulations partially obstruct equilibrium ownership dynamics. For example, U.S. REITs have to comply with the "5–50" rule, which states that the five largest shareholders can possess no more than 50 percent of the firm's shares.[1] In addition, REITs must have at least 100 shareholders.[2] These requirements, combined with the specific governance structure in which REIT managers must operate, likely weakens the influence of the market on the ownership structure, thereby mitigating part of the endogeneity problem underlying governance–performance research.

The role of REIT shareholder composition in resolving agency conflicts is also complicated by the strict legal constraints imposed on REITs, which may mitigate the need for external monitoring or inside incentive alignment. For example, to keep their tax-exempt status, REITs must distribute 90 percent of taxable (GAAP) income in dividends. This dividend payout requirement may enhance corporate governance in two ways. First, it largely mitigates the free cash flow problem (Jensen, 1986), thereby potentially reducing the necessity of shareholder activism. Second, REITs must frequently return to the capital market to raise additional debt and equity capital. This provides external capital sources (*i.e.*, banks and other investors) an opportunity to collect information and to monitor the firm on an ongoing basis. Gibson et al., 2004 investigate the behavior of institutional investors around the date of a firm's seasoned equity offering (SEO) and find evidence that non-REIT investors use previously collected information to evaluate the quality of the firm. Finally, U.S. REITs have a highly restricted investment opportunity set because 75 percent of gross income must be derived from real estate assets and 75 percent of assets must be real estate (equity or debt ownership). These restrictions may reduce managerial empire building, excess diversification, and other value-destructing behavior.

Nevertheless, agency problems in the REIT sector may, in fact, be exacerbated by its regulatory environment. For example, the market for corporate control seems to function differently in the REIT sector as hostile takeovers rarely occur (Campbell et al., 2001; Eichholtz and Kok, 2008). Second, competition in the labor market is somewhat restricted as managers are highly specialized, which may induce managers to reduce effort level (Han, 2006). Third, the 5–50 rule and the requirement that REITs have at least 100 shareholders obstructs shareholder concentration and thus may hinder the ability of institutional investors and blockholders to actively monitor the REIT.

Direct empirical evidence on the influence of a public real estate company's shareholder base on performance and share turnover is limited. With respect to managerial ownership, Han (2006) documents a significant and robust nonlinear relationship between Tobin's Q and insider ownership, which is consistent with an entrenchment effect that materializes at high levels of insider ownership. In contrast, Friday and Sirmans (1998) observe a positive relation between the real dollar value of director ownership and market-to-book ratios, thereby providing support for the convergence of interest hypothesis and the benefits that are connected to an increased level of insider stock ownership.

Friday et al., 1999 are among the few authors that have investigated the effects of block ownership in the context of REITs. Friday et al. uncover a positive coefficient for small levels of ownership; however, at higher levels, firm performance is negatively related to block ownership. For institutional ownership, Friday and Sirmans (1998) find that the investment selection of REITs is more closely tied to Tobin's Q if institutions hold a larger percentage of the firm. This finding is consistent with the notion that institutional investors act as monitors by carefully scrutinizing the management of the firm.

Finally, Hartzell et al. (2006) are among the first to model the potential endogeneity of the governance–performance relationship. This is accomplished by using investments rather than firm valuation as a proxy for performance and by using a 2SLS-specification of their model. Hartzell et al.

[1] Several REITs have introduced excess shareholder provisions in order to prevent violation of the 5–50 rule (Chan et al., 2003).

[2] These are the specific rules for U.S. REITs, but are applied in an adapted form in other real estate markets as well.

(2006) find no empirical relation between shareholder composition and firm value, but do find a relationship between the shareholder base and investment activity.

3. Data

3.1. Ownership data

We combine the ownership composition dataset of the Global Property Research (GPR) General Database with the Reuters/Thomson Ownership Module; financial data are obtained from Datastream Advance and Worldscope. The GPR General Database is comprised of all publicly listed property companies with market capitalizations in excess of $50 million. Constituent companies must derive at least 75 percent of their operational revenues from investment activities (property investment companies) or a combination of investment and development activities (hybrid property companies). Companies may focus their investment activities in a particular property type (*i.e.*, office, residential, retail, or industrial) or may diversify across property types. In the ownership section of this international database, the stakes of all significant stockholders are tracked from the start until the end of their positions.

The Reuters/Thomson Ownership Module covers all publicly traded real estate investment companies from around the world and contains information on significant stakeholders and their short-term ownership history. Combining the information of GPR and Reuters/Thomson, we assemble a database of ownership composition in listed property firms in the five most prominent financial markets in the world: Australia, France, Japan, the United Kingdom, and the United States. Our final sample contains more than 300 property companies.

Table 1 provides descriptive statistics on the concentration of shareholders in 2008 and 2009. In 2009, the largest Australian shareholder owned, on average, 15 percent of outstanding shares. The corresponding percentage for Japan, the U.K., and the U.S. is roughly similar. Notably, the largest shareholder in French property companies controlled 46 percent of firm shares, on average, in 2009. The five largest Australian shareholders owned, on average, 38 percent of outstanding property shares in 2009. The corresponding percentage in Japan, the U.K., and the U.S. is, again, roughly similar. In contrast, the five largest French shareholders controlled 62 percent of shares, on average. Overall, the data displayed in Table 1 reveal, with the exception of France, roughly similar concentrations of firm shares among large blockholders. The average block holdings of firms in our five samples are also displayed graphically in Fig. 1. The bars show the average percentage of outstanding shares held by the largest shareholder (Top 1), the three largest shareholders, (Top 3), the five largest shareholders (Top 5), and the ten largest shareholders (Top 10). France is clearly an outlier in our sample.

Table 2 provides additional information on the composition of the shareholder base in 2009. A corresponding table for 2008 is contained in the Appendix. In Australia, 47 percent of all shareholders are identified by Thomson Financial via required year-end filings. The remaining 53 percent are non-filing retail investors. Slightly less than half of the identifiable shareholder base, or 23 percent of all shareholders, are institutional investors, such as banks, insurance companies, investment advisors, investment companies, foundations, and pension funds. Thomson Financial categorized twenty-five percent of Australia's shareholders as non-institutional investors. This investor type includes mutual funds, company insiders, and large blockholders. At 24 percent and 29 percent, respectively, the institutional investor base in Japan and the U.K. is similar to that of Australia. However, only 18 percent of shareholders in French property companies are categorized as institutional. In sharp contrast, institutional investors held 56 percent of REIT shares in the U.S. at year-end 2009.

Panel B of Table 2 disaggregates the identifiable shareholder base by investor type. In four out of five countries, investment advisors represent the largest block of shareholders, ranging from 28 percent of the identifiable base in France to 58 percent in the U.S. Investment advisors are defined by Thomson Financial as "...entities that manage assets for private clients and institutions". It is interesting to note that corporate ownership of listed property shares varies significantly across countries, ranging from just 4 percent of the investor base in the U.S. to 41 percent in France. Hedge funds also have significant ownership stakes in the U.K. and the U.S., representing 31 percent and 23 percent of the shareholder base, respectively, in these two countries. However, hedge fund ownership is significantly less pronounced in Australia, Japan and, especially, France, all countries with significantly more corporate ownership.

Table 1
Share ownership concentration.

	2008			2009		
	Mean	Median	St. dev.	Mean	Median	St. dev.
Australia ($n = 32$)						
Top – 1	15.4	12.5	10.3	15.1	13.2	9.6
Top – 3	31.1	28.9	14.2	29.9	27.2	14.3
Top – 5	36.6	31.7	14.1	37.6	34.9	16.0
Top – 10	47.0	48.8	16.7	45.3	41.3	17.3
France ($n = 23$)						
Top – 1	54.8	59.8	27.8	46.0	53.9	26.4
Top – 3	65.0	65.4	25.8	58.0	61.3	26.6
Top – 5	68.4	72.4	25.7	61.7	68.8	27.4
Top – 10	70.9	75.4	25.5	64.0	69.7	27.8
Japan ($n = 50$)						
Top – 1	16.0	9.9	11.2	16.5	10.2	13.6
Top – 3	29.4	23.8	15.4	29.7	23.3	18.2
Top – 5	36.6	30.2	16.6	36.6	29.5	19.5
Top – 10	46.2	42.7	17.8	45.0	40.3	20.8
U.K. ($n = 44$)						
Top – 1	19.7	15.0	15.4	18.9	13.8	15.2
Top – 3	34.6	31.5	17.3	34.2	29.8	17.5
Top – 5	43.3	41.3	16.2	42.7	38.4	17.3
Top – 10	57.2	58.3	14.1	54.6	52.9	16.3
U.S. ($n = 111$)						
Top – 1	12.7	9.3	12.6	13.4	9.3	12.5
Top – 3	26.9	23.7	13.4	27.8	23.6	13.7
Top – 5	36.8	34.2	13.9	37.0	33.0	13.2
Top – 10	50.9	50.6	15.2	50.5	48.9	13.4

Notes: In this table, we report for year-end 2008 and 2009 the mean, median, and standard deviation of the dispersion of ownership concentration for our sample of international real estate companies. The rows display the aggregate percentage of outstanding shares held by the largest (top 1), three largest (top 3), five largest (top 5), and ten largest (top 10) shareholders, respectively. The data were obtained from the Thomson Ownership Module.

The ownership stakes of listed real estate shares by insiders and other wealthy individuals is a striking 26 percent in France and 16 percent in the U.K. In contrast, insider and individual ownership in Japan, Australia, and the U.S. is 1 percent, 8 percent, and 7 percent, respectively. The data reveal that pension and endowment funds represent relatively small fractions of the investor base in all five

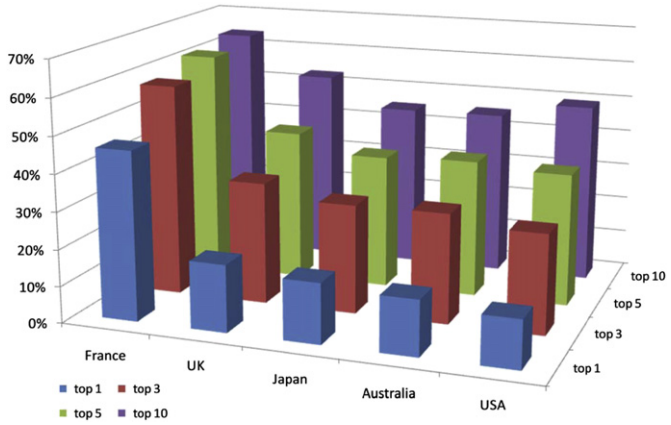

Fig. 1. . Ownership clusters of International REITs (2009). Notes: In this figure, we present the dispersion of shareholdings for our sample of international REITs. The numbers show the aggregate percentages of outstanding shares that are held by the largest (top 1), three largest (top 3), five largest (top 5), and ten largest (top 10) shareholders of each individual REIT. The numbers relate to the year-end of 2009 and are obtained from the Thomson Ownership Module.

Table 2
Breakdown of ownership profiles (2009).

	Australia	France	Japan	U.K.	U.S.
Panel A: Identifiable ownership					
All	47.3%	66.5%	48.8%	73.7%	84.5%
Institutional ownership	22.8%	17.5%	23.8%	28.7%	55.6%
Non-institutional ownership	24.5%	49.0%	25.0%	45.1%	28.9%
Panel B: Investor Type of Identifiable shareholders					
Banks	0.7%	0.7%	9.5%	2.5%	0.8%
Insurance companies	0.0%	0.6%	4.7%	1.1%	0.2%
Investment advisors	54.3%	28.3%	37.0%	32.2%	57.7%
Pension & Endowment funds	0.4%	0.2%	0.7%	2.1%	6.3%
Corporations	25.5%	40.8%	26.8%	14.1%	3.5%
Individuals (including insiders)	7.6%	25.7%	1.3%	16.1%	7.4%
Hedge funds	9.8%	3.6%	14.0%	31.2%	22.6%
Other	1.8%	0.0%	6.0%	0.6%	1.6%

Notes: In Panel A, we report the 2009 breakdown of the total identified investor base between institutional and non-institutional shareholders. Panel B contains for identifiable shareholders, a breakdown of ownership shares by investor type. The sum of the ownership percentages in panel B are equal to the "All" identifiable ownership percentage in the first row of panel A.

countries. However, it is important to note that the ownership positions of investment advisors include shares held on behalf of pension and endowment funds. Banks directly control 9 percent of property shares in Japan. However, the percentage of bank ownership in our other four countries exceeds one percent in only the U.K. Finally, insurance companies directly own 5 percent of listed property shares in Japan; the corresponding percentage in the remaining countries is one percent or less. Overall, Panel B of Table 2 reveals significant variation in the composition of the shareholder base across international real estate securities markets, reflecting different institutional and regulatory environments.

3.2. Extreme event days

We next identify trading days in 2008 and 2009 in which movements in the general stock market index of a country were extreme. We use the Morgan Stanley Capital Index (MSCI) for each country as our proxy for the general stock market and calculate the average daily total return and standard deviation on the MSCI Index for each country over the 2005–2007 period.[3] We then calculate the mean daily excess stock return in each country (realized return minus the 2005–2007 average) for each trading day in 2008 and 2009. If the absolute value of the excess return on a given day in a given country exceeds the mean excess return in 2005–2007 by more than two standard deviations, we define the MSCI general stock market return on that day as "extreme".[4] This classification procedure produces 142 extreme event days in 2008 and 2009 across our five-country sample.

In Panel A of Table 3, we list the trading days during which at least one of the five national stock market indices experienced an abnormally large positive return (*i.e.,* an extreme "up-market" day). For example, on January 23, 2008, the Australian MSCI produced an excess return of 4.26 percent. This return exceeds the mean excess return in 2007–2009 by more than two standard deviations; thus, it is classified as abnormal or extreme. An "*" indicates an extreme excess return. Note that January 23, 2008 was not an extreme up-market day in the other four markets. In fact, both France and the U.K. experienced negative excess returns on this date. On January 24, 2008, the MSCI in both France and the U.K. produced abnormally large excess returns. Although the excess MSCI returns in Australia, Japan, and the U.S. were positive on this date, our procedure does not classify the returns as extreme. Overall, there are 37 days in 2008 and 2009 in which the stock market in at least one country experienced an extreme up-market. In Panel B of Table 3, we

[3] We use 2005–2007 as our estimation period for normal stock returns to avoid a look ahead bias in our classification of excess returns in 2008 and 2009.

[4] The definition of extreme returns is based on local price dynamics. We estimate the mean excess return for the period 2005–2007 for each market separately, and define extreme return days by adding and subtracting two standard deviation of the same local market index. This allows us to incorporate the local market dynamics, instead of using a preselected fixed cut-off point for all markets.

Table 3
Extreme stock market return days.

	MSCI Australia	MSCI France	MSCI Japan	MSCI UK	MSCI USA
Panel A: Percentage excess return on extreme up days					
23-Jan-08	4.26*	−4.06	2.48	−2.29	2.11
24-Jan-08	3.14	5.92*	2.67	4.71*	1.09
25-Jan-08	5.14*	−0.64	4.78*	−0.20	−1.57
19-Mar-08	4.33*	−0.66	2.84	−1.06	−2.43
25-Mar-08	3.69*	3.60	1.66	3.59	0.32
2-Apr-08	2.93	0.96	4.45*	1.08	−0.17
21-Jul-08	3.83*	0.69	0.00	0.53	0.08
8-Sep-08	4.08*	3.30	3.97*	3.90	1.88
19-Sep-08	4.67*	8.87*	5.13*	8.86	4.13
30-Sep-08	−4.59	2.01	−3.85	1.72	5.37*
1-Oct-08	4.52*	0.38	1.41	1.19	−0.54
13-Oct-08	5.87*	10.92*	0.00	8.12	11.68*
14-Oct-08	3.72*	2.85	13.95*	3.15	−0.70
17-Oct-08	−1.34	4.33*	3.24	5.04	−0.47
20-Oct-08	4.67*	3.38	3.84	5.32	4.78*
21-Oct-08	4.14*	0.69	3.50	−1.19	−3.06
28-Oct-08	−0.17	1.70	4.95*	1.87	10.58*
29-Oct-08	1.36	8.86*	6.31*	7.99	−0.79
30-Oct-08	3.92*	0.43	8.77*	1.29	2.64
3-Nov-08	5.03*	1.21	0.00	1.57	−0.30
4-Nov-08	−0.03	4.66*	5.35*	4.46	4.07
10-Nov-08	1.22	1.21	4.32*	0.82	−1.33
21-Nov-08	2.26	−3.12	2.82	−2.45	6.33*
24-Nov-08	0.12	9.77*	0.00	9.71	6.49*
25-Nov-08	6.29*	1.25	3.75	0.45	0.71
28-Nov-08	4.60*	0.47	0.75	1.46	0.97
8-Dec-08	4.22*	8.24*	3.52	6.20	3.84
16-Dec-08	−0.72	2.00	−2.23	0.70	5.14*
21-Jan-09	−1.16	−0.60	−2.38	−0.76	4.33*
26-Jan-09	0.00	3.56	−0.74	3.93	0.55
27-Jan-09	3.34	0.01	5.12*	−0.35	1.10
4-Mar-09	−1.66	4.66*	0.56	3.84	2.39
10-Mar-09	1.37	5.54*	−0.89	4.95	6.35*
23-Mar-09	2.50	2.55	3.57	2.89	6.97*
31-Mar-09	−0.66	3.27	−2.05	4.34	1.30
2-Apr-09	2.83	5.27*	4.48*	4.40	2.91
7-May-09	1.79	−0.91	4.85*	−0.06	−1.37
Panel B: Percentage excess return on extreme down days					
21-Jan-08	−2.98	−6.66*	−3.58	−5.40*	0.00
22-Jan-08	−6.84	2.28	−5.82*	2.98	−1.09
25-Jul-08	−3.71*	0.55	−2.65	−0.25	0.44
15-Sep-08	−1.78	−3.59	0.00	−3.92*	−4.69*
16-Sep-08	−1.21	−1.79	−5.34*	−3.40	1.75
17-Sep-08	−0.75	−2.15	0.45	−2.27	−4.68*
18-Sep-08	−2.44	−0.97	−2.58	−0.61	4.29*
22-Sep-08	5.18*	−2.26	2.05	−1.46	−3.84
29-Sep-08	−2.18	−4.89*	−1.87	−5.32*	−8.75*
6-Oct-08	−3.08	−8.89*	−4.54*	−7.79*	−3.93
7-Oct-08	2.01	0.29	−2.18	0.29	−5.77*
8-Oct-08	−5.02*	−6.14*	−8.18*	−5.04*	−1.12
9-Oct-08	−1.51	−1.20	0.63	−1.27	−7.51*
10-Oct-08	−8.31*	−7.64*	−7.28*	−8.75*	−1.22
15-Oct-08	−0.91	−6.82*	−0.24	−7.11*	−9.08*
16-Oct-08	−6.60*	−5.81*	−9.91*	−5.42*	4.18
22-Oct-08	−3.33	−5.02*	−7.25*	−4.39*	−6.12*
23-Oct-08	−4.48*	0.20	−2.10	1.11	1.06
24-Oct-08	−2.56	−3.66	−7.79*	−5.02*	−3.40
27-Oct-08	−1.21	−3.76	−7.47*	−0.77	−3.26
5-Nov-08	2.74	−2.17	6.38*	−2.32	−5.26
6-Nov-08	−4.30*	−6.41*	−6.40*	−5.65*	−5.04*

Table 3 (*continued*)

	MSCI Australia	MSCI France	MSCI Japan	MSCI UK	MSCI USA
11-Nov-08	−3.66	−4.64*	−3.11	−3.56	−2.24
12-Nov-08	−0.71	−2.84	−1.70	−1.55	−5.20*
13-Nov-08	−6.25*	0.82	−4.53*	−0.38	6.92
19-Nov-08	−0.62	−4.00	−1.13	−4.85*	−6.18*
20-Nov-08	−4.35*	−3.32	−5.80*	−3.22	−6.80*
1-Dec-08	−1.77	−5.40*	−0.91	−5.14*	−8.97*
2-Dec-08	−4.48	2.19	−5.04*	1.39	3.97
5-Dec-08	−1.21	−5.21*	−0.46	−2.69	3.68
12-Dec-08	−2.44	−2.69	−4.59*	−2.47	0.79
13-Jan-09	−0.83	−1.45	−4.95*	−0.62	0.26
14-Jan-09	0.94	−4.39*	0.52	−5.01*	−3.37*
15-Jan-09	−4.20*	−1.72	−3.07%	−1.53	0.23
20-Jan-09	−3.25	−2.10	−1.53%	−0.47	−5.31*
23-Jan-09	−4.43*	−0.88	−2.94%	−0.03	0.58
10-Feb-09	−0.47	−3.54	−0.20%	−2.23	−4.81*
17-Feb-09	−1.71	−2.93	−1.83%	−2.51	−4.52*
2-Mar-09	−2.99	−4.26*	−3.25%	−5.40*	−4.72*

Notes: This table lists trading dates on which the local MSCI in at least one country is "extreme". An extreme stock market returnday is one in which the difference between the absolute MSCI return on that day and the 2007–2009 average daily national MSCI returns exceeds the mean 2007–2009 return by more than two standard deviations. Panel A present excess returns on days in which the excess return in at least one of our five countries was excessively positive. Panel B presents excess returns for each country on days in which the excess return in at least one of our five countries was excessively negative.

* Indicates a significant excess return that is included in our extreme up day and extreme down day samples, respectively.

list the corresponding 39 trading days during 2008 and 2009 when at least one of the five national MSCI indexes experienced an abnormally large negative return (*i.e.*, an extreme "down-market" day).

4. Empirical methodology

We test the hypothesis that the cross-sectional variation in the composition of the shareholder base is associated with the stock market performance and share turnover of listed property companies on extreme event days. To test this hypothesis, we first examine whether the return performance of individual property companies on days during which the market is experiencing extreme returns is related to several measures of the firm's shareholder composition (*composition*): *concentration*, the percentage of outstanding shares owned by the largest shareholders and *institutional*, which is the percentage of shareholders classified by Reuters/Thomson as institutional. In separate specifications, we also decompose institutional ownership into its various subgroups, including investment advisors, hedge funds, banks, insurance companies, and pension and endowment funds, as well as include the percentage of shares owned by corporations and other wealthy individuals.

We first present univariate statistics on differences in event day excess returns and share turnover, as well as important firm characteristics for each of our shareholder composition proxies. We then model the excess return on each event day as a function of a constant, a measure of the firm's shareholder composition (*composition*), lagged share turnover, and a set of independent control variables:

$$er_{it} = \alpha + \gamma_1 composition_{it} + \gamma_2 laggedturnover_{it} + \gamma_3 size_{it} + \gamma_4 beta_{it} + \gamma_5 variance_{it} + \varepsilon_i \qquad (1)$$

where er_{it} is the excess return for firm i on the event day t, α is a constant, and ε_i is the error term. The variable $laggedturnover_{it}$ in Eq. (1) is the daily trading volume of firm i's shares on the trading day that proceeds the extreme event day, expressed as a percentage of the total number of outstanding shares.[5] We include *laggedturnover* to control for the preference of investors for more liquid stocks, all else equal. $size_{it}$ is the natural logarithm of the market value of firm i's common equity 50 days prior to the

[5] We use lagged share turnover in our analysis of abnormal daily stock returns because turnover and returns on the event day are determined simultaneously.

event date. The market value of equity is included as a control variable for several reasons. First, Lakonishok et al. (1992) find that institutional investors prefer larger firms. Second, Fama and French (1992) and numerous subsequent authors find that firm size is an empirical risk proxy. Thus, its inclusion avoids a potential missing variable problem in the regression.

$beta_{it}$ is the time-varying (single-factor) beta of firm i computed using firm-level returns for days t-250 to t-50; the return on the MSCI index in firm i's country is used as the proxy for the return on the market portfolio. Similar to *size*, *beta* is an empirical proxy for risk. Thus, its exclusion could mask a relation between shareholder composition and returns. $variance_{it}$ is the variance of the market model residual for firm i on day t for the period from t-250 to t-50 days. Dierkens (1991) posits that idiosyncratic volatility proxies for informational asymmetries. If institutional investors are informed investors, as has been argued by numerous researchers, we should expect a negative correlation between the level of institutional ownership and the degree of information asymmetry. Therefore, the exclusion of *variance* from the excess return regression could bias the results. Finally, $composition_{it}$ is a variable, such as the percentage of shares owned by institutional investors or the percentage held by the largest blockholders, that describes firm i's investor base at time t.

To make inferences about the relation between firm-level excess returns on extreme event days and the composition of a firm's shareholder base, we estimate a pooled regression, using data from all five countries, in which we combine the time-series of extreme up-market event days with the cross-section of property companies. We also include country fixed-effects and a set of categorical variables that capture the firm's property type focus as reported by Global Property Research. It is well known that the risk-return characteristics of listed property companies vary with the property type specialization of the firm. A corresponding pooled, time series cross-sectional excess return regression is estimated for our sample of extreme down-market days.

The importance of clustering standard errors at the firm level to control for firm-specific effects is well known. However, the clustering of events on certain days may also create a problem (Dennis and Strickland, 2002). More specifically, the residual for firm i on day t may be contemporaneously correlated with the residual for firm j on day t. This correlation of residuals across time could produce coefficient standard errors that are biased downwards. To control for the potential that residuals are correlated across both firms and time, we adjust our estimated standard errors using the procedure developed by Thompson (2010).[6]

Our analysis of extreme returns tests the hypothesis that firm-level variation in the composition of the shareholder base helps to explain the variation in daily share price changes across public real estate companies. However, a potential source of the relation between event-day excess returns and the composition of the shareholder base is trading volume (Dennis and Strickland, 2002). For example, if banks tend to herd on days when the general stock market is experiencing large gains, this herding behavior is likely to produce more buys than sells by banks and thereby contribute to the larger share price movements on extreme up market days among companies with larger concentrations of bank ownership. Therefore, we also examine the relation between share turnover and shareholder composition on our sample of extreme event days.

More specifically, we model abnormal share turnover on event-day i as a function of a constant, a measure or measures of the firm's shareholder composition ($composition_{it}$), and our previously defined set of independent control variables:

$$abnormalturnover_{it} = \alpha + \gamma_1 composition_{it} + \gamma_2 size_{it} + \gamma_3 beta_{it} + \gamma_4 variance_{it} + \varepsilon_i \quad (2)$$

where $abnormalturnover_{it}$ is calculated as the event date t share turnover of firm i minus the average daily turnover of firm shares over the 250 trading days that proceed the event day. We include *size* and *variance* in the turnover regression because of the preference among many institutional investors for

[6] Alternatively, we could estimate a cross-sectional regression for each event day, and base inferences on the time-series average of the coefficients. However, this approach is problematic for countries with a small number of cross-sectional observations. Moreover, the number of extreme event days is limited, which may lead to biased estimates when using the Fama and MacBeth (1973) procedure.

large stocks with high idiosyncratic volatility. *beta* is included to capture any relation between systematic risk and turnover.

To make inferences about the relation between abnormal turnover on extreme event days and the composition of a firm's shareholder base, we again estimate a pooled regression, using data from all five countries, in which we combine the time-series (*i.e.*, all event days) with the cross-section of property companies. Country and property type fixed effects are also included. To control for residuals that are correlated across both firms and time, we again adjust our estimated standard errors using the procedure developed by Thompson (2010).

Table 4 provides univariate statistics for the variables in our regression models. Panel A provides variable means for extreme up-market days; panel B provides the corresponding statistics for down-market days. At 3.5 percent, average excess returns (er_i's) on days in which when the general stock market rises significantly are highest for U.S. REITs. Negative excess returns (panel B) are also larger, on average, in the U.S. on extreme down market days. Mean excess returns for real estate stocks on extreme up-market days are smaller in other markets, ranging from 0.8 percent in France to 1.1 percent in Australia. Mean excess returns range from −2.4 percent (Japan) to −1.3 percent (France) on extreme down-market days. These mean excess returns indicate that the exposure of real estate

Table 4
Event day descriptive statistics.

	Australia	France	Japan	U.K.	U.S.
Panel A: Extreme up markets					
er	0.011	0.008	0.01	0.01	0.035
	(0.030)	(0.029)	(0.031)	(0.027)	(0.040)
turnover	0.006	0.002	0.000	0.014	0.141
	(0.011)	(0.008)	(0.002)	(0.136)	(2.573)
size	2.857	2.581	4.827	2.216	2.875
	(0.673)	(1.066)	(0.623)	(0.517)	(0.894)
beta	0.784	0.451	0.788	0.741	1.107
	(0.571)	(0.378)	(0.398)	(0.424)	(0.541)
variance	0.000	0.000	0.000	0.000	0.000
	(0.001)	(0.002)	(0.000)	(0.000)	(0.001)
concentration	0.164	0.508	0.163	0.195	0.129
	(0.103)	(0.260)	(0.119)	(0.151)	(0.126)
institutional	0.268	0.156	0.244	0.324	0.551
	(0.177)	(0.197)	(0.107)	(0.176)	(0.214)
Panel B: Extreme down markets					
er	−0.020	−0.013	−0.024	−0.018	−0.037
	(0.033)	(0.029)	(0.027)	(0.025)	(0.035)
turnover	0.004	0.003	0.000	0.005	0.049
	(0.005)	(0.016)	(0.002)	(0.019)	(0.458)
size	2.796	2.599	4.87	2.28	2.889
	(0.696)	(1.078)	(0.593)	(0.484)	(0.890)
beta	0.812	0.46	0.806	0.781	1.098
	(0.531)	(0.383)	(0.389)	(0.438)	(0.535)
variance	0.000	0.000	0.000	0.000	0.000
	(0.001)	(0.001)	(0.000)	(0.000)	(0.001)
concentration	0.163	0.516	0.163	0.196	0.129
	(0.103)	(0.259)	(0.115)	(0.152)	(0.126)
institutional	0.259	0.154	0.247	0.332	0.551
	(0.170)	(0.191)	(0.106)	(0.177)	(0.214)

Notes: This table presents event-day means and standard deviations (in parentheses) for regression variables. An event-day is defined as a trading day in 2008 or 2009 in which the difference between the absolute MSCI return in a country and the corresponding 2007–2009 average daily national MSCI returns exceeds the mean 2005–2007 mean return by more than two standard deviations. *er* is the mean excess return; *turnover* is the daily trading volume expressed as a percentage of the total number of shares outstanding on the event-day; *size* is the natural logarithm of the market value of common equity 50 days prior to the event-day; *beta* is the mean market beta computed using returns for days [−250, −50] for the local MSCI USA; *variance* is the mean variance of stock returns for days [−250, −50]; *concentration* is the percentage of shares owned by the largest shareholder; and *institutional* is the percentage of outstanding shares owned by institutional investors as designated by the Thomson Ownership Module.

stocks to movements in the general stock market is more limited in non-U.S. markets. Indeed, average betas for extreme up-market days range from 0.451 (France) to 0.788 (Japan), as compared to 1.107 in the U.S. Average betas of similar magnitudes are observed in our sample of down-market days. Thus, we observe no evidence of asymmetric stock price responses in extreme up and down markets.

Average daily share turnover is highest in the U.S., but substantially lower in Australia, France, Japan, and the U.K. In fact, share turnover in Japan on event days is negligible. Also, property share investors seem to trade more when the general stock market rises significantly: *turnover* is substantially higher in extreme up markets as compared to down markets in the U.K. and, especially, the U.S. This short-term finding is consistent with the theory of loss aversion, which posits that investors are more likely to dispose of assets that have appreciated significantly while holding onto assets that have underperformed. A comparison of the mean values of *size* indicates that Japanese property companies are among the largest in the sample; the smallest property companies are found in the U.K.

The data on shareholder concentration and composition are consistent with descriptive evidence presented in the previous section: institutional shareholdings are highest in the U.S., and lowest in France. This contrasts sharply with the holdings of the largest shareholder, which averages more than 50 percent in France. In the remaining four markets, the percentage of outstanding shares owned by the largest shareholder ranges from 12.9 percent in the U.S. to 19.5 percent in the U.K. Differences in the means of *concentration* and *institutional* in extreme up versus down markets are negligible.

5. Empirical results

5.1. Abnormal returns

Table 5 contains the results from separately estimating Eq. (1) for extreme up-market and down-market days using our pooled time-series cross-sectional data set. The primary variable of interest in these specifications is *concentration*, the percentage of outstanding shares held by the largest shareholders. In column (1) of Table 5 we report results using the percentage of outstanding shares held by the largest shareholder as our measure of *concentration*. Including country and property type fixed-effects, the excess return model reported in column (1) explains 10.3 percent of the variation in the excess returns of listed property companies on extreme up market days.

The estimated coefficient on lagged turnover in up markets is positive and significant. The estimated coefficient on *size* is also positive and significant in extreme up markets. As expected, the estimated coefficient on *beta* is positive and highly significant; that is, high beta firms have larger positive excess returns on extreme up days. Regarding the variable of primary interest in Table 5, the estimated coefficient on *concentration* cannot be distinguished from zero. Although not separately tabulated, the block holdings of the five and ten largest shareholders display a similar association with excess returns on up-market days.

In column (2) of Table 5, we replace *concentration* with variables that interact *concentration* with country dummies; the U.S. is the omitted country. This specification is constructed to capture differences across countries in the effects of shareholder concentration on excess returns. However, none of the interaction coefficients are significant, suggesting that, in extreme up markets, the influence of large block holdings on excess returns in Australia, the U.K., Japan, and France does not vary significantly from the U.S. As expected, the magnitude and significance of the estimated coefficients on $turnover_{t-1}$, *size*, *beta*, and *variance* are not materially affected by this alternative specification that allows the excess return intercept to vary across countries.

The specifications reported in columns (1) and (2) of Table 5 captures the linear relation between excess returns and the percentage of shares held by the largest shareholders. This assumption of linearity, however, may be unduly restrictive. Following Morck et al. (1998), we therefore estimate a piecewise linear regression that allows for two changes in the slope coefficient of *concentration*. More specifically, we use the following variables to estimate and report our piecewise linear regressions:

Table 5
Event-day excess return regressions: shareholder concentration.

Variables	Up markets			Down markets		
	(1)	(2)	(3)	(4)	(5)	(6)
concentration	−0.000			0.012***		
	[0.004]			[0.003]		
*concentration***Australia*		0.018			0.005	
		[0.015]			[0.015]	
*concentration***UK*		0.001			−0.003	
		[0.007]			[0.006]	
*concentration***Japan*		−0.011			0.016*	
		[0.011]			[0.009]	
*concentration***France*		0.005			0.005	
		[0.006]			[0.006]	
Concentration categories						
*con*0–5			0.259			−0.188
			[0.219]			[0.162]
*con*5–25			0.005			0.015
			[0.013]			[0.011]
con > 25			−0.005			0.011**
			[0.007]			[0.005]
$turnover_{t-1}$	0.080**	0.080**	0.079**	−0.105*	−0.112*	−0.101
	[0.035]	[0.035]	[0.035]	[0.063]	[0.064]	[0.062]
size	0.004**	0.004**	0.004**	0.002	0.002	0.002
	[0.002]	[0.002]	[0.002]	[0.001]	[0.001]	[0.001]
beta	0.019***	0.019***	0.019***	−0.023***	−0.023***	−0.023***
	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]
variance	0.203	0.251	0.177	3.130	2.932	3.069
	[1.956]	[1.937]	[1.945]	[2.404]	[2.396]	[2.404]
Country-fixed effects	Y	Y	Y	Y	Y	Y
Property type-fixed effects	Y	Y	Y	Y	Y	Y
Constant	−0.043***	−0.042***	−0.055***	0.023***	0.026***	0.032***
	[0.005]	[0.005]	[0.012]	[0.004]	[0.004]	[0.009]
Observations	2,742	2,742	2,742	3,290	3,290	3,290
R-squared	0.108	0.109	0.110	0.134	0.132	0.134
Adjusted R^2	0.103	0.103	0.104	0.129	0.127	0.130

Notes: *turnover* is the daily trading volume expressed as a percentage of the total number of shares outstanding on the event-day; *size* is the natural logarithm of the market value of common equity 50 days prior to the event-day; *beta* is the mean market beta computed using return for days [−250, −50] for the local MSCI USA; *variance* is the mean variance of stock returns for days [−250, −50]; *concentration* is the percentage of shares owned by the largest shareholder; *con0–5* = *concentration* if *concentration* < 0.05, *con*0–5 = 0.05 if *concentration* ≥ 0.05. *con*5–25 = 0 if *concentration* < 0.05, *con*5–25 = *concentration* minus 0.05 if 0.05 ≤ *concentration* ≤ 0.25, *con*5–25 = 0.20 if *concentration* ≥ 0.25. *con* > 25 = 0 if *concentration* < 0.25, *con* > *25* = *concentration* minus 0.25 if *concentration* ≥ 0.25. Standard errors in brackets. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

$$
\begin{aligned}
con0-5 &= concentration \text{ if } concentration < 0.05,\\
&= 0.05 \text{ if } concentration \geq 0.05;\\
con5-25 &= 0 \text{ if } concentration < 0.05,\\
&= concentration \text{ minus } 0.05 \text{ if } 0.05 \leq concentration < 0.25,\\
&= 0.20 \text{ if } concentration \geq 0.25;\\
con > 25 &= 0 \text{ if } concentration < 0.25,\\
&= concentration \text{ minus } 0.25 \text{ if } concentration \geq 0.25.
\end{aligned}
$$

For example, if the largest shareholder owns 29 percent of outstanding shares, then *con*0–5 = 0.05; *con*5–25 = 0.20; and *con* > 25 = 0.04.

The results obtained from estimating this alternative specification are reported in column (3) of Table 5. The estimated coefficients on *con*0–5, *con*5–25, and *con* > 25 cannot be distinguished from zero in extreme up markets. Moreover, the magnitude and significance of the estimated coefficients on $turnover_{t-1}$, *size*, *beta*, and *variance*, as well as the overall explanatory power of the model, remain essentially unchanged. Similar results are obtained when *concentration* is defined as the percentage of

shares held by the five and ten largest shareholders, respectively. Overall, the results reported in columns (1) through (3) of Table 5 suggest that firm-level returns on extreme up-market days are not related to shareholder concentration.

A corresponding set of results for down-market days is reported in columns (4) through (6) in Table 5. Focusing on column (4), we find that the estimated coefficient on *concentration* is positive and highly significant, suggesting that negative returns in extreme down markets are partially mitigated by the presence of a large block holder. In contrast to extreme up markets, the estimated coefficient on lagged turnover is negative and marginally significant; that is, high turnover firms are associated with even larger share price declines in down markets, *ceteris paribus*. The estimated coefficient on *size* cannot be distinguished from zero. This result is also in contrast to our up-markets results where we find that firm size is positively related to excess returns. As expected, higher beta stocks experience significantly larger price declines in extreme down markets. Similar to our up-market results, the estimated coefficient on *variance* cannot be distinguished from zero. Thus, idiosyncratic risk does not appear to play a role in the return generating process on extreme event days.

In column (5) we report results obtained when *concentration* is replaced with variables that interact *concentration* with country dummies. The U.S. is again the omitted country. These results provide some weak evidence that negative stock price movements in Japan are partially mitigated by the presence of a large block holder. The coefficient estimates on our control variables and their statistical significance remain essentially unchanged.

Finally, turning to the results for down market days estimated with piecewise linear regression (column (6) in Table 5), we find evidence that the effects of shareholder concentration are nonlinear. A large concentration of shares by the firm's largest shareholder ($con > 25$) is associated with smaller stock price declines in extreme down markets.

Overall, the results presented in Table 5 provide little support for an association between large block holdings and stock price movements among real estate firms in extreme up markets. However, large block holdings do appear to bolster stock prices on days in which the market experiences extreme negative returns.

Table 6 presents the results from estimating Eq. (1) using the percentage of outstanding shares owned by institutional investors (*institutional*) as our measure of shareholder composition. In specification (1), the estimated coefficient on institutional cannot be distinguished from zero. The estimated coefficients on *size* and *beta* are very similar in magnitude to the results obtained using *concentration*, although the estimated coefficient on lagged turnover is insignificant.

In column (2) of Table 6, we replace *institutional* with a set of variables that interact *institutional* with country dummies; the U.S. is again the omitted country. The interaction coefficients for Australia, the U.K., and Japan are not statistically significant, suggesting the effect of institutional holdings on excess returns in these countries does not vary from the effects in the U.S. However, the estimated coefficients on *institutional***France* is negative and significant; that is, a high level of institutional holding appears to dampen returns in France on up market days, relative to the U.S. effect.

To allow for nonlinearities in the relation between institutional holdings and excess returns, we estimate a piecewise linear regression similar in specification to the regression used in our analysis of large block holdings. More specifically, we use the following variables to estimate and report our piecewise linear regressions:

$$
\begin{aligned}
inst0-5 &= institutional \text{ if } institutional < 0.05,\\
&= 0.05 \text{ if } institutional \geq 0.05;\\
inst5-25 &= 0 \text{ if } institutional < 0.05,\\
&= institutional \text{ minus } 0.05 \text{ if } 0.05 \leq institutional < 0.25,\\
&= 0.20 \text{ if } institutional \geq 0.25;\\
inst > 25 &= 0 \text{ if } institutional < 0.25,\\
&= institutional \text{ minus } 0.25 \text{ if } institutional \geq 0.25.
\end{aligned}
$$

As reported in Column (3) of Table 6, we find no evidence of significant non-linearities in the relation between institutional ownership and excess return in extreme up markets. Interestingly, however, the estimated coefficient on lagged turnover is positive and significant in this piecewise regression specification.

Table 6
Event-day excess return regressions: percentage institutional ownership.

	Up markets			Down markets		
Variables	(1)	(2)	(3)	(4)	(5)	(6)
institutional	−0.000			−0.001		
	[0.003]			[0.003]		
*institutional*Australia*		0.003			−0.026**	
		[0.012]			[0.011]	
*institutional*UK*		0.003			−0.003	
		[0.006]			[0.006]	
*institutional*Japan*		−0.010			−0.022***	
		[0.011]			[0.009]	
*institutional*France*		−0.015**			0.011*	
		[0.007]			[0.006]	
Institutional categories			0.007			0.002
*inst*0–5			[0.006]			[0.005]
			−0.001			0.009*
*inst*5–25			[0.006]			[0.004]
			−0.005			0.022***
inst > *25*			[0.006]			[0.005]
$turnover_{t-1}$	0.001	0.001	0.079**	0.002***	0.002***	−0.099
	[0.001]	[0.001]	[0.035]	[0.000]	[0.000]	[0.062]
size	0.005***	0.005***	0.004**	0.001	0.001	0.002
	[0.001]	[0.001]	[0.002]	[0.001]	[0.001]	[0.001]
beta	0.018***	0.018***	0.019***	−0.023***	−0.023***	−0.023***
	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]
variance	−0.568	−0.612	0.211	2.814	2.726	3.021
	[1.816]	[1.802]	[1.950]	[2.231]	[2.213]	[2.405]
Country-fixed effects	Y	Y	Y	Y	Y	Y
Property type-fixed effects	Y	Y	Y	Y	Y	Y
Constant	−0.040***	−0.041***	−0.043***	0.027***	0.026***	0.024***
	[0.004]	[0.004]	[0.005]	[0.003]	[0.003]	[0.004]
Observations	2,821	2,821	2,742	3,374	3,374	3,290
R-squared	0.099	0.100	0.109	0.126	0.129	0.136
Adjusted R^2	0.094	0.094	0.103	0.122	0.124	0.131

Notes: *turnover* is the daily trading volume expressed as a percentage of the total number of shares outstanding on the event-day; *size* is the natural logarithm of the market value of common equity 50 days prior to the event-day; *beta* is the mean market beta computed using return for days [−250, −50] for the local MSCI USA; *variance* is the mean variance of stock returns for days [−250, −50]; *institutional* is the percentage of outstanding shares owned by institutional investors; *inst*0–5 = *institutional* if *institutional* < 0.05, *inst*0–5 = 0.05 if *institutional* ≥ 0.05. *inst*5–25 = 0 if *institutional* < 0.05, *con*5–25 = *institutional* minus 0.05 if 0.05 ≤ *institutional* < 0.25, *inst*5–25 = 0.20 if *institutional* ≥ 0.25. *inst* > *25* = 0 if *institutional* < 0.25, *inst* > *25* = *institutional* minus 0.25 if *institutional* ≥ 0.25. Standard errors in brackets. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

We next turn to the results for our sample of extreme down-market days. The estimated coefficient on *institutional* [column (4)] cannot be distinguished from zero. However, in contrast to extreme up-market days, there is a positive and significant relation between lagged turnover and excess returns. Moreover, whereas the estimated coefficients on *size* are consistently positive and significant in up markets, firm size does not appear to be related to returns in extreme down markets. As expected, the estimated coefficient on *beta* is negative and significant in down markets. Similar to our prior results, we find no role for *variance* in explaining the variation in excess returns in extreme down markets.

In column (5) of Table 6, we replace *institutional* with variables that interact *institutional* with country dummies; the U.S. is the omitted country. In contrast to our results in extreme up markets, the effects of institutional holdings appears to vary significantly by country. Relative to the U.S., a larger institutional base appears to exacerbate negative returns in down markets in Australia and Japan. In contrast, large institutional holdings appear to (marginally) bolster returns in down markets in France.

Finally, turning to the results for down-market days estimated using piecewise linear regression (column (6)), we find strong evidence that the effects of institutional holdings on excess returns are non-linear. More specifically, if the concentration of institutional investors increases, the marginal effects of an increase lead to significantly higher excess returns in extreme down markets.

Overall, the results presented in Table 6 provide little support for an association between institutional ownership holdings and stock price movements among real estate firms in extreme up markets which is comparable to the role of shareholder concentration on stock price movements in up markets. Moreover, with the exception of France, the effects do not appear to vary significantly across countries. However, a large percentage ownership by institutions does appear to bolster stock prices on days in which the market experiences extreme negative returns. This positive effect is more significant among firms with higher concentrations of institutional ownership. We also find evidence that the effect of institutional ownership in down markets varies significantly by country, which may be related to the average size of institutional holdings in each country.

As discussed previously, the investment objectives and behavior of different "institutional" investors may vary significantly. For example, some prior research suggests mutual funds are the most active traders among institutional investors. In contrast, Dennis and Strickland (2002) argue that banks tend to be less active institutional traders. If different types of institutions react differently on extreme event days, the estimated coefficient on *institutional* may be masking significant differences in the effects of banks, hedge funds, insurance companies, pension funds, and investment advisors on stock prices in volatile markets. Therefore, to capture potential heterogeneity among institutional investors, we estimate a revised version of Eq. (1) in which we replace the aggregate percentage of institutional ownership with the percentage of outstanding shares held by various institutional owner types, as well as the share ownership of corporations and wealthy individuals. Because the relative roles of investor type are likely to vary significantly across countries, we estimate these pooled time series cross-sectional regressions separately for each country in our sample. These disaggregated share ownership results are reported in panels A (up markets) and B (down markets) of Table 7.

Table 7
Event-day excess return regressions: disaggregated investor types.

Variables	USA	UK	Japan	France	Australia
	(1)	(2)	(3)	(4)	(5)
Panel A: Extreme up markets					
Ownership type (*percent*)					
Bank	0.266	−0.022	0.003	1.012	1.703
	[0.182]	[0.030]	[0.034]	[0.751]	[1.818]
Hedge funds	0.008	0.007	−0.034**	0.041	0.050
	[0.011]	[0.012]	[0.017]	[0.052]	[0.049]
Corporations	−0.003	0.004	−0.007	−0.005	0.017
	[0.009]	[0.010]	[0.011]	[0.010]	[0.020]
Individuals	−0.004	0.005	−0.015	0.025**	−0.042
	[0.008]	[0.010]	[0.127]	[0.010]	[0.069]
Advisors	−0.021***	0.012	−0.015	−0.003	0.003
	[0.007]	[0.010]	[0.019]	[0.013]	[0.016]
Insurance companies	−0.081	0.045	−0.020	−0.588*	−13.841
	[0.109]	[0.049]	[0.057]	[0.312]	[49.087]
Pension funds	0.113**	0.029	0.410	−0.073	−0.096
	[0.047]	[0.041]	[0.661]	[0.065]	[0.221]
$turnover_{t-1}$	−0.001	0.104**	1.159***	−0.632	0.780***
	[0.001]	[0.040]	[0.414]	[0.818]	[0.291]
size	0.001	−0.001	0.006**	0.005	0.006
	[0.002]	[0.003]	[0.003]	[0.011]	[0.008]
beta	0.030***	0.008**	0.007*	0.000	−0.003
	[0.005]	[0.004]	[0.004]	[0.018]	[0.009]
variance	−2.003	−11.727**	12.346**	4.797	1.057
	[2.472]	[5.326]	[5.186]	[4.110]	[7.336]
Constant	−0.044***	−0.011	−0.039**	−0.019	−0.029
	[0.005]	[0.009]	[0.015]	[0.019]	[0.026]
Property type-fixed effects	Y	Y	Y	Y	Y
Observations	1,153	503	585	198	382
R-squared	0.204	0.074	0.096	0.115	0.071
Adjusted R^2	0.192	0.043	0.071	0.052	0.028

Table 7 (*continued*)

Variables	USA	UK	Japan	France	Australia
	(1)	(2)	(3)	(4)	(5)
Panel B: Extreme down markets					
Ownership type (*percent*)					
Bank	0.046	0.065***	−0.009	−1.436**	−0.624**
	[0.126]	[0.014]	[0.024]	[0.629]	[0.296]
Hedge funds	−0.008	0.006	0.014	0.024	−0.033
	[0.008]	[0.010]	[0.013]	[0.035]	[0.049]
Corporations	0.008	0.025***	0.010	0.021**	−0.012
	[0.007]	[0.008]	[0.008]	[0.010]	[0.015]
Individuals	0.025***	0.020**	0.094	0.001	−0.017
	[0.007]	[0.009]	[0.119]	[0.012]	[0.043]
Advisors	0.012***	0.019*	−0.019	0.017	−0.016
	[0.005]	[0.011]	[0.019]	[0.012]	[0.012]
Insurance companies	−0.084	0.040	0.005	0.418	55.552
	[0.070]	[0.046]	[0.057]	[0.260]	[47.369]
Pension funds	−0.004	−0.066	−0.505	0.037	0.008
	[0.029]	[0.059]	[0.590]	[0.057]	[0.347]
$turnover_{t-1}$	0.002***	0.076	−1.071***	0.542	−0.509*
	[0.000]	[0.051]	[0.364]	[0.882]	[0.291]
size	0.001	0.003	−0.003	0.004	0.001
	[0.001]	[0.003]	[0.003]	[0.008]	[0.005]
beta	−0.030***	−0.016***	−0.007**	−0.010	−0.027**
	[0.003]	[0.003]	[0.003]	[0.007]	[0.011]
variance	5.618***	3.981	−14.582*	0.095	7.511
	[2.141]	[6.112]	[7.708]	[7.537]	[6.309]
Constant	0.028***	−0.003	0.030**	−0.017	0.027
	[0.004]	[0.008]	[0.015]	[0.019]	[0.018]
Property type-fixed effects	Y	Y	Y	Y	Y
Observations	1633	540	675	252	274
R-squared	0.204	0.144	0.088	0.103	0.122
Adjusted R^2	0.196	0.117	0.066	0.054	0.064

Notes: *turnover* is the daily trading volume expressed as a percentage of the total number of shares outstanding on the event-day; *size* is the natural logarithm of the market value of common equity 50 days prior to the event-day; *beta* is the mean market beta computed using return for days [−250, −50] for the local MSCI USA; *variance* is the mean variance of stock returns for days [−250, −50]. Standard errors in brackets. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

Perhaps the most striking results reported in Table 7 relate to the investor type composition patterns previously reported in panel B of Table 2. There we noted that *individual* investors are remarkably dominant in France, that *hedge funds* are more active in purchasing real estate shares in the U.K. and the U.S., and that the fraction of shares owned by corporations is large in both Japan and France. Reviewing the results in Table 7 with these patterns in mind, we find little evidence that the relative ownership positions of *hedge funds* are associated with stock price movements on extreme events days. The only exception appears to be Japan, where the percentage of shares held by hedge funds is negatively related to excess returns in up (but not down) markets. Thus, in contrast to popular opinion, we find no consistent evidence that hedge fund ownership amplifies price increases or decreases in volatile stock markets.

In extreme up markets, the percentage of shares held by banks and corporations is not related to excess returns in any of the five countries. However, the percentage of shares owned by banks is negatively related to returns in down markets in France and Australia, suggesting that bank ownership in these two countries exacerbates negative returns. In contrast, the percentage of shares owned by banks in the U.S. is positively and significantly related to excess returns in down markets. In addition, the percentage of shares owned by corporations is positively and significantly related to excess returns in down markets in the U.K. and France. In France, we find that a larger percentage of holdings by individual investors is associated with significantly higher returns in up markets; however, the holdings of individuals are not related to returns on down market days in France.

In the U.S., the holdings of investment advisors are negatively related to returns in up markets; the percentage of shares held by pension funds is positively related to returns. In down markets, a larger percentage of shares held by both individuals and investment advisors bolsters returns in a down U.S.

market. Finally, none of the estimated coefficients on the percentage of shares hold by the various investor types in the U.K. are significant in extreme up markets. However, in down markets, the larger the percentage of shares held by corporations, individuals, and advisors the higher are the excess returns. Overall, the results reported in Table 7 suggest that the composition of institutional holdings, as well as the holdings of corporations and individual investors, play a more significant role in extreme down markets.

5.2. Share turnover

The second part of our analysis relates to share turnover on extreme event days. Table 8 presents the results from estimating Eq. (2) using our pooled time-series cross-sectional data set. Abnormal turnover is the dependent variable and *concentration* is our measure of shareholder composition. In column (1), the estimated coefficient on *concentration* is not distinguishable from zero. The estimated coefficient on *size* is positive and highly significant and the estimated coefficient on *variance* cannot be distinguished from zero.

The replacement of *concentration* with a set of *concentration* and country interaction variables (column (2)) does little to increase the explanatory power of the model; moreover, none of the interactions are statistically significant, indicating no variation in the effect of large block holdings across countries. In addition, our piecewise regression (column (3)) does not uncover any significant non-linearities in the relation between shareholder concentration and abnormal turnover in up markets. The adjusted R^2 of the three regression specifications in extreme up markets are less than four

Table 8
Event-day abnormal turnover regressions: shareholder concentration.

	Up markets			Down markets		
	(1)	(2)	(3)	(4)	(5)	(6)
concentration	−0.003			−0.004***		
	[0.003]			[0.001]		
*concentration*Australia*		−0.002			0.001	
		[0.007]			[0.003]	
*concentration*UK*		−0.012			0.001	
		[0.010]			[0.002]	
*concentration*Japan*		0.005			0.009***	
		[0.004]			[0.002]	
*concentration*France*		0.025			0.003	
		[0.015]			[0.003]	
Concentration categories						
*con*0–5			0.315			0.084**
			[0.205]			[0.039]
*con*5–25			−0.007			0.001
			[0.011]			[0.004]
con > 25			−0.003			−0.007***
			[0.005]			[0.002]
size	0.005***	0.005***	0.004**	0.006***	0.006***	0.006***
	[0.002]	[0.002]	[0.002]	[0.000]	[0.000]	[0.000]
variance	15.267	15.973	15.278	5.297***	5.611***	5.289***
	[10.089]	[10.268]	[10.121]	[1.458]	[1.472]	[1.468]
Constant	0.005	0.003	−0.009*	−0.005***	−0.007***	−0.010***
	[0.005]	[0.006]	[0.005]	[0.001]	[0.001]	[0.002]
Country-fixed effects	Y	Y	Y	Y	Y	Y
Property type-fixed effects	Y	Y	Y	Y	Y	Y
Observations	2,726	2,726	2,726	3,272	3,272	3,272
R-squared	0.040	0.041	0.040	0.194	0.194	0.195
Adjusted R^2	0.035	0.035	0.035	0.190	0.189	0.191

Notes: The dependent variable, abnormal turnover, is the event day share turnover of firm *i* minus the average daily share turnover over the 250 trading days that proceeds the event day. Share turnover is the daily trading volume expressed as a percentage of the total number of shares outstanding on the event-day; *size* is the natural logarithm of the market value of common equity 50 days prior to the event-day; *variance* is the mean variance of stock returns for days [−250, −50]; *concentration* is the percentage of shares owned by the largest shareholder; *con*0–5 = *concentration* if *concentration* < 0.05, *con*0–5 = 0.05 if *concentration* ≥ 0.05. *con*5–25 = 0 if *concentration* < 0.05, *con*5–25 = *concentration* minus 0.05 if 0.05 ≤ *concentration* < 0.25, *con*5–25 = 0.20 if *concentration* ≥ 0.25. *con* > *25* = 0 if *concentration* < 0.25, *con* > *25* = *concentration* minus 0.25 if *concentration* ≥ 0.25. Standard errors in brackets. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

percent; thus, we are able to explain little of the variation in abnormal turnover on days in which the market experienced abnormally high returns.

Consistent with our excess return results, however, the composition of the shareholder base explains significantly more of the variation in abnormal turnover in extreme down markets (columns (4) through (6)). More specifically, the estimated coefficient on *concentration* is negative and highly significant (column (4)), suggesting that in down markets, highly concentrated share ownership is associated with significantly less unexpected turnover. The estimated coefficient on *size* remains positive and highly significant. In addition, the estimated coefficient on *variance* is positive and highly significant. That is, high idiosyncratic risk predicts more turnover, but only in down markets. Similar to our excess return results in down markets, the positive impact of shareholder concentration on abnormal turnover is greater in Japan than in the U.S.

Finally, our piecewise regression (column (6)) uncovers significant non-linearities in the relation between shareholder concentration and abnormal turnover in down markets. If ownership concentration is low, abnormal turnover is exacerbated; in contrast, high levels of ownership concentration moderate abnormal turnover. Moreover, the adjusted R^2s, which range from 0.189 to 0.191, are substantially higher than the corresponding regressions in up markets.

The results reported in Table 9 reflect the replacement of *concentration* with *institutional* in our abnormal turnover regressions. Similar to our shareholder concentration results, the addition of the

Table 9
Event-day abnormal turnover regressions: percentage institutional ownership.

	Up markets			Down markets		
	(1)	(2)	(3)	(4)	(5)	(6)
institutional	0.058			0.024**		
	[0.043]			[0.011]		
*institutional*Australia*		0.123			0.041	
		[0.120]			[0.025]	
*institutional*UK*		0.295			0.067*	
		[0.219]			[0.039]	
*institutional*Japan*		0.663			0.138	
		[0.466]			[0.084]	
*institutional*France*		0.465			0.088	
		[0.323]			[0.057]	
Institutional categories						
*inst*0–5			0.006			0.000
			[0.005]			[0.001]
*inst*5–25			0.014			−0.003
			[0.013]			[0.002]
inst > 25			−0.015**			−0.008***
			[0.007]			[0.002]
size	−0.486	−0.613	−0.001	−0.084*	−0.083*	0.006***
	[0.333]	[0.419]	[0.004]	[0.050]	[0.050]	[0.000]
variance	−163.912	−246.918	12.894	−30.657	−30.386	5.316***
	[123.764]	[179.696]	[9.294]	[20.541]	[20.369]	[1.474]
Constant	1.496	1.529	0.002	0.259*	0.269*	−0.006***
	[1.020]	[1.036]	[0.004]	[0.149]	[0.155]	[0.001]
Country-fixed effects	Y	Y	Y	Y	Y	Y
Property type-fixed effects	Y	Y	Y	Y	Y	Y
Observations	2,801	2,801	2,726	3,354	3,354	3,272
R-squared	0.042	0.048	0.046	0.045	0.046	0.195
Adjusted R^2	0.038	0.042	0.040	0.041	0.041	0.191

Notes: The dependent variable, abnormal turnover, is the event day share turnover of firm *i* minus the average daily share turnover over the 250 trading days that proceeds the event day. Share turnover is the daily trading volume expressed as a percentage of the total number of shares outstanding on the event-day; *size* is the natural logarithm of the market value of common equity 50 days prior to the event-day; *beta* is the mean market beta computed using return for days [−250, −50] for the local MSCI USA; *variance* is the mean variance of stock returns for days [−250, −50]; *institutional* is the percentage of outstanding shares owned by institutional investors; *inst0–5* = *institutional* if *institutional* < 0.05, *inst*0–5 = 0.05 if *institutional* ≥ 0.05. *inst*5–25 = 0 if *institutional* < 0.05, *con*5–25 = *institutional* minus 0.05 if 0.05 ≤ *institutional* < 0.25, *inst5*–25 = 0.20 if *institutional* ≥ 0.25. *inst* > 25 = 0 if *institutional* < 0.25, *inst* > 25 = *institutional* minus 0.25 if *institutional* ≥ 0.25. Standard errors in brackets. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

Table 10
Event-day day abnormal share turnover regressions: disaggregated investor types.

Variables	USA	UK	Japan	France	Australia
	(1)	(2)	(3)	(4)	(5)
Panel A: Extreme up markets					
Ownership type (*percent*)					
Bank	27.322	0.025	−0.002**	0.142	−0.658
	[18.543]	[0.039]	[0.001]	[0.173]	[0.502]
Hedge funds	0.111	0.022	−0.000	0.011	−0.011
	[0.168]	[0.040]	[0.000]	[0.010]	[0.010]
Corporations	−0.995	−0.015	−0.001**	0.000	−0.012**
	[0.665]	[0.024]	[0.000]	[0.001]	[0.005]
Individuals	−1.826	0.035	−0.006*	0.002	0.036*
	[1.210]	[0.045]	[0.003]	[0.003]	[0.021]
Advisors	−0.734	0.048	−0.001	0.002	−0.006
	[0.498]	[0.042]	[0.000]	[0.002]	[0.006]
Insurance companies	−5.334	0.047	−0.001	−0.076	−54.398***
	[3.568]	[0.116]	[0.003]	[0.074]	[20.909]
Pension funds	5.816	−0.120	−0.054**	−0.005	0.097
	[3.838]	[0.148]	[0.026]	[0.008]	[0.077]
size	−0.988	−0.004	0.000	−0.001	0.005**
	[0.663]	[0.005]	[0.000]	[0.002]	[0.002]
variance	−444.694	157.714	0.134*	0.549	−0.258
	[307.435]	[108.283]	[0.079]	[0.736]	[1.630]
Property type-fixed effects	Y	Y	Y	Y	Y
Constant	3.210	−0.020	0.000	0.002	−0.007*
	[2.145]	[0.041]	[0.000]	[0.004]	[0.004]
Observations	1,153	492	585	189	382
R-squared	0.085	0.245	0.044	0.055	0.096
Adj R^2	0.073	0.223	0.021	−0.004	0.059
Panel B: Extreme down markets					
Ownership type (percent)					
Bank	4.111*	−0.004	−0.005***	0.572	0.051
	[2.293]	[0.005]	[0.002]	[0.685]	[0.034]
Hedge funds	0.023	−0.000	−0.001**	0.027	0.008
	[0.026]	[0.004]	[0.000]	[0.032]	[0.006]
Corporations	−0.166*	−0.009	−0.002***	−0.004	0.000
	[0.086]	[0.005]	[0.001]	[0.004]	[0.002]
Individuals	−0.300*	−0.001	−0.019***	0.004	0.004
	[0.154]	[0.005]	[0.007]	[0.006]	[0.003]
Advisors	−0.123*	0.003	−0.001	0.005	0.001
	[0.064]	[0.005]	[0.000]	[0.007]	[0.002]
Insurance companies	−0.802*	−0.009	−0.009***	−0.233	−20.721**
	[0.449]	[0.014]	[0.003]	[0.278]	[9.724]
Pension funds	0.950**	−0.005	−0.114***	0.006	0.047
	[0.474]	[0.047]	[0.039]	[0.010]	[0.048]
size	−0.148*	−0.003	0.000***	−0.006	0.002*
	[0.086]	[0.002]	[0.000]	[0.007]	[0.001]
variance	−71.520*	39.335**	0.305*	2.571	−1.400*
	[42.185]	[15.578]	[0.170]	[1.626]	[0.803]
Constant	0.491*	0.007	0.000	0.015	−0.002
	[0.279]	[0.007]	[0.000]	[0.016]	[0.002]
Property type-fixed effects	Y	Y	Y	Y	Y
Observations	1633	530	675	242	274
R-squared	0.081	0.461	0.075	0.184	0.150
Adj R^2	0.073	0.446	0.055	0.145	0.101

Notes: The dependent variable, abnormal turnover, is the event day share turnover of firm *i* minus the average daily share turnover over the 250 trading days that proceeds the event day. Share turnover is the daily trading volume expressed as a percentage of the total number of shares outstanding on the event-day; *size* is the natural logarithm of the market value of common equity 50 days prior to the event-day; *variance* is the mean variance of stock returns for days [−250, −50]. Standard errors in brackets. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

percentage of shareholders who are institutional to the regression specifications does little to improve the explanatory power of the excess return models in our sample of extreme up-market days. Moreover, we find no evidence that the effects of institutional ownership vary significantly across the five countries in our sample (column (2)). We do, however, uncover evidence that the effect of *institutional* on abnormal turnover is non-linear (column (3)). That is, the effect of an increase in *institutional* on abnormal turnover is negative, but only if *institutional* exceeds 25 percent. Moreover, neither *size* nor *variance* is significant in the three abnormal turnover regressions in up markets.

As displayed in column (4) of Table 9, the estimated coefficient on *institutional* is positive and significant in extreme down markets. Relative to the U.S., the positive effect of *institutional* on abnormal turnover is magnified somewhat in the U.K (column (5)); the interactions of *institutional* with country dummies are not significant in Australia, Japan, and France. However, we again find strong evidence that the effects of *institutional* are highly non-linear [column (6)]. More specifically, the estimated coefficient on $inst > 25$ is negative and highly significant, suggesting that the moderating effects of increased institutional holdings on abnormal turnover does not manifest itself at low levels of institutional holdings. It is important to note that controlling for non-linearity when estimating the effects of institutional holdings on abnormal turnover changes the estimated sign and significance of the coefficients on *size* and *variance*. In additional, the overall explanatory power of the model increases from just 4 percent to over 19 percent.

Finally, in panels A and B of Table 10 we report results from estimating our abnormal turnover regressions disaggregating institutional ownership into its component parts and considering the effects of corporations and wealthy individuals. In both the U.K. and France, none of the estimated coefficient on the percentage of shares held by various investor types are significantly different from zero – in either up or down markets. Clearly, the composition of the investor bases in these markets adds little to our ability to explain variations in abnormal share turnover.

In the U.S. sample, none of the estimated coefficients on the percentage ownership of various investor types are significant in extreme up markets. However, in down markets, the coefficient estimates on the percentage of shares owned by banks, individuals, and pension funds are positive and significant, suggesting that these three investor types tend to trade more in the face of large stock price declines. In contrast, corporations, advisors, and insurance companies tend to trade less in response to steep U.S. stock price declines. Across our five country sample, variations in the ownership of various investor types matters most in Japan. In particular, banks, corporations, and pension funds appear to trade less in both extreme up and down markets.

6. Summary and conclusion

The shareholder composition of listed property companies (REITs) has changed substantially over the past decades. This may affect REIT returns, considering evidence in the literature that the concentration of (large) shareholders can affect stock returns and share turnover, especially during volatile trading days. For investments in publicly-traded real estate companies, however, these effects may be less pronounced, due to the unique institutional setting in which REITs operate.

In this paper, we use a unique combination of data sources to examine the ownership structure of property companies in five different countries; Australia, France, Japan, the U.K., and the U.S. Descriptive results show a wide variation in ownership concentration, ownership identity, and ownership turnover, across the five markets. We relate these ownership-related measures to firm-level excess returns and abnormal share turnover on "extreme" trading days during the turbulent stock market years of 2008 and 2009.

Our regression results are consistent with the notion that the cross-section of excess returns and share turnover on extreme event days is related to the composition of a public real estate company's shareholder base. However, the composition of the investor base is substantially more important on days during which the general stock market in a country experiences an extreme decline. In particular, the returns of listed property companies are higher on extreme down days if the ownership stake of the largest shareholder is large; this is especially true if the largest stakeholder owns more than 25 percent of outstanding shares. Returns are also higher on extreme down days if the stake of institutional

investors is larger. Again, the positive effect of institutional ownership on stock prices in down markets is more pronounced when institutional investors hold more than 25 percent of outstanding shares. Moreover, the importance of institutional holdings is strongest in the U.S. (and to some extent Japan), where institutional ownership is greatest. We also find some support for the importance of disaggregating institutional investors into specific categories. However, this disaggregation appears to be statistically and economically important only in extreme down markets during which, on many occasions, we observe that the presence of certain investor types have different and offsetting effects on the magnitude of excess returns and turnover. Thus, the aggregation of institutional investors into one large category may hinder our ability to explain excess returns and share turnover in extreme down markets.

We find that abnormal turnover among listed property companies is significantly lower on extreme down days if the ownership stake of the largest shareholder is large and/or if the ownership share of institutional investors is high; this dampening of turnover on extreme down days is especially pronounced among firms with institutional ownership greater than 25 percent. Similar to our excess return results, we find that disaggregating institutional ownership by type adds relatively little explanatory power in our abnormal turnover regressions in up markets.

Our findings indicate that with the continuing maturation of listed property markets, the investor base has moved away from traditional buy-and-hold retail investors to institutional investors, corporations, and wealthy individual blockholders. These investors moved into indirect real estate investments as a substitute for direct property exposure. The current shareholder base also contains investors that are more volatile, short-term oriented, and move with the market. These investors affect stock returns on volatile days and seem to treat investments in real estate stocks as similar to regular corporates, rather than long-term, high-yield, real estate substitutes.

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Appendix

Breakdown ownership Profiles (2008).

	Australia	France	Japan	U.K.	U.S.
Panel A: Identifiable ownership					
All	53.35%	73.83%	53.26%	57.20%	87.79%
Institutional ownership	26.94%	20.58%	27.55%	24.52%	54.41%
Non-institutional ownership	26.41%	53.25%	25.71%	32.68%	33.38%
Panel B: Investor type					
Banks	0.74%	0.37%	11.60%	1.00%	0.68%
Insurance companies	0.01%	0.37%	4.85%	1.15%	1.38%
Investment advisors	49.19%	25.98%	34.86%	36.99%	55.55%
Pension & endowment funds	0.56%	1.16%	0.42%	3.75%	4.37%
Corporations	30.07%	44.85%	25.21%	12.26%	4.11%
Individuals (including insiders)	4.26%	23.12%	1.05%	14.84%	7.68%
Hedge funds	13.41%	3.09%	13.76%	28.09%	23.88%
Other	1.76%	1.06%	8.25%	1.93%	2.35%

Notes: In this table, we present the breakdown of the total identified investor base of the REITs in our samples for the year-end of 2008. In Panel A, this total is first spread over the categories institutional and non-institutional owners. In Panel B, we provide an overview of the breakdown in investor type.

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