# Managerial Ownership and Firm Value: Evidence from Japan[1]

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**Abstract**

By using nearly 60,000 firm-years of Japanese firms from 2000 to 2017, we find that, in general, the relation between a firm's managerial ownership and Tobin's *q* is positive. The positive relation is robust to both measurement error and the influence of outliers, and it is due to the subset of young firms with high managerial ownership that have higher Tobin's *q*. The general reduction in managerial ownership after an IPO is the primary factor contributing to the change in managerial ownership. Our results suggest that the fraction of newly listed firms is a decisive factor in the relation between managerial ownership and firm value. When we restrict our sample to larger firms, a hump-shaped relation is observed, at which point our analysis is consistent with the prior literature on American firms. For firm-years in the low liquidity bracket, the relation is inversely hump-shaped and mostly negative. The firm-years in the low liquidity bracket have a different relation between managerial ownership and Tobin's *q* compared to those in the high liquidity bracket, at which point American and Japanese firms are similar.

**JEL classification**: G30, G32

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## 1. Introduction

In the United States, in the corporate finance literature, it is well known that Tobin's *q* first increases, then declines, and finally rises as ownership by corporate directors increases (Morck, Shleifer and Vishny 1988, p. 293, hereafter MSV). Based on a larger sample, McConnell and Servaes (1990, p. 595) also find a curvilinear relation between the fraction of managerial ownership and Tobin's *q*. Holderness, Kroszner and Sheehan (1999, p. 465) show that the shape of the relation between firm performance and the level of managerial ownership in 1935 is similar to what MSV find with 1980 data. Kim and Lu (2011, p. 289) demonstrate that the relation between CEO ownership and Tobin's *q* is hump-shaped when external governance is weak, but the relation is insignificant when external governance is strong.

The relation between managerial ownership and Tobin's *q* is often analyzed by cross-sectional regressions without controlling for firm fixed effects. In the beginning, Himmelberg, Hubbard and Palia (1999, p. 353, hereafter HHP) document that after controlling for both observed firm characteristics and firm fixed effects, they cannot conclude (econometrically) that changes in managerial ownership affect Tobin's *q*. In commenting on HHP, Zhou (2001, pp. 559, 566) points out that because managerial ownership typically changes slowly from year to year within a firm, fixed effects estimators may not detect an effect of ownership on performance, and if ownership is important to managerial incentives, its effect on performance would necessarily show up in cross-sectional tests. More recently, by using more than 50,000 firm-years from 1988 to 2015, Fabisik, Fahlenbrach, Stulz and Taillard (2018, hereafter FFST) show that the empirical relation between a firm's managerial ownership and Tobin's *q* is systematically negative. Specifically, by adopting adjusted Fama-MacBeth (hereafter FM) regressions (Fama and MacBeth 1973), FFST (pp. 27-28) conclude that the relation between managerial ownership and Tobin's *q* documented in the literature does not hold for larger samples that include a greater number of smaller firms, even though for the subset of the largest firms, their estimates are similar to those found in MSV and McConnell and Servaes (1990).

There has also been discussion regarding whether the relation is causal. By examining a sample of firms adopting target ownership plans, Core and Larcker (2002, p. 317) find that the required increases in the level of managerial ownership result in improvements in firm performance. Coles, Lemmon and Meschke (2012, p. 149) conclude that proxy variables, fixed effects and instrumental variables do not generally provide reliable solutions to simultaneity bias. In this setting, Li, Sun and Yannelis (2018, p. 1) identify the causal effects by exploiting the 2003 tax cut, which increased net-of-tax managerial ownership, and uncover a hump-shaped improvement in Tobin's *q* as a response to the level of managerial ownership.

In this paper, we focus on Japanese firms, in an effort to further clarify the relation between managerial ownership and firm value, and to examine the relevance and external validity of theories and empirical evidence from American firms. In Japan, the number of equities (both common equities and dual-class stocks) owned by directors and officers (*shikkōyaku*) is disclosed on an individual basis as an item in Annual Securities Reports (*yūkashōken hōkokusho*, Japan's version of the Form 10-K), and the information about managerial common equity ownership is commercially available as data (Nikkei Directors and Officers data (*yakuin* data), see Appendix A) from the fiscal year ended in March 2003 to the present for all firms listed on a stock exchange in Japan.[3] To the best of our knowledge, our paper is the first to analyze Japanese firms in large datasets and to clarify the relevance and external validity of theories and empirical evidence from American firms in the context of the relation between managerial ownership and firm value.[4]

The paper proceeds as follows. In Section 2, we introduce and present the institutional setting and data, and summary statistics. We consider determinants of managerial ownership in Section 3. Then, in Section 4, we report that in Japanese firms, the empirical relation between

[3] FFST (p. 5) collect data from Compact Disclosure for the period from 1988 to 2003 and download and parse all proxy materials and information statements from the EDGAR website for the period from 2004 to 2016.

[4] Kaplan (1994, p. 535 Table 4, pp. 539-541) analyzes the director and officer ownership in relation to cash compensation. Weakly related literature includes Morck, Nakamura and Shivdasani (2000) and Franks, Mayer and Miyajima (2014).

managerial ownership and Tobin's *q* is statistically significantly positive in general. In Section 5, we clarify the external validities of theories and empirical evidence from American firms. We conclude in Section 6.

## 2. Data and summary statistics

### 2-1. Data

#### 2-1-1. Managerial ownership

We first describe our data in relation to the institutional setting in Japan. In Japan, the number of equities owned by directors and officers is disclosed on an individual basis under the "Cabinet Office Ordinance on the Disclosure of Corporate Affairs, etc." The amount of stock options granted to directors and officers, however, is not disclosed.[5] Traditionally, ownership did not include shares held by relatives and trusts of the directors (Kaplan 1994, p. 539). However, by the amendment of the Ordinance on March 31, 2005 (effective from April 1, 2005 to the present), ownership is changed to a substantial basis, which includes the shares for which the director or officer is substantially able to exercise their voting rights and to receive dividends substantially.[6]

For determining the amount of common equity outstanding as a denominator for managerial ownership fraction (*m*), we use common equity outstanding as of the date on which an Annual Securities Report is submitted.[7]

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[5] Therefore, Kato, Lemmon, Luo and Schallheim (2005, p. 439) analyze stock option plan adoptions by using the sample provided by Daiwa Securities. When analyzing the relation between managerial ownership and firm value, it is common not to include options that have been granted but whose earliest exercise date is more than 60 days from the date of the proxy (Holderness, Kroszner and Sheehan 1999, p. 449; FFST pp. 4-5).

[6] The findings reported in our paper hold even when we start our sample period from April 2005, and they are robust to the point in the text (for other robustness tests, see Section 4-3).

[7] Different from American firms, Japanese firms generally do not specify the record date of managerial ownership. Japanese law ("Cabinet Office Ordinance on the Disclosure of Corporate Affairs, etc.") generally defines the information on managers as of the date of submitting an Annual Securities Report, but the record date of managerial ownership appears not to be explicitly clarified. However, several firms voluntarily report that the date is the same as that of submission. For that date, we use Nikkei NEEDS Financial Quest data (A01071 [reporting date

2-1-2. Sample periods and firms

We start our sample period from fiscal year 2000.[8] To do so, we hand-collect Annual Securities Reports from PRONEXUS' eol database for fiscal years 2000 to 2002 (specifically, for fiscal years that ended from April 2000 to February 2003, which are not covered in the Nikkei Directors and Officers data) and obtain data on managerial ownership for the period.[9] Our sample period ends in fiscal year 2017 (March 2018 at the latest firm).

We set our potential sample firms as all those listed on a stock exchange in Japan during the sample period. Specifically, we obtain potential firm-years by combining Nikkei NEEDS Financial Quest (hereafter FQ) data, which covers all Annual Securities Reports (except for those submitted by foreign firms), and the stock price data provided by Financial Data Solutions (hereafter FDS) to confirm that a firm is listed on the date on which its fiscal year ends. This leaves us with 66,786 potential firm-years.

Next, we exclude 2,080 firm-years belonging to financial firms (Tokyo Stock Exchange (hereafter TSE) industry codes: 7050, 7100, 7150 and 7200), utilities (4050) or investment corporations (the code is missing).[10] We also eliminate 195 firm-years in which a

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/ scheduled reporting date] and A01037 [annual shareholders' meeting date] when it is missing). Listed firms typically submit an Annual Securities Report immediately after an annual general meeting, which is generally about three months after the fiscal year-end date. Our approach is consistent with the past literature on American firms (Fahlenbrach and Stulz 2009, p. 346; FFST p. 6) in that the fiscal year-end date is prior to the record date or the submission date, but the time lag between the two is larger for Japanese firms than for American firms.

[8] For the entire sample firms, the fiscal year ends on March 31 for approximately 70%, December 31 for approximately 8% and February 28 (or 29) for approximately 6%. Considering these facts, the sample firms are categorized into each year group according to the month in which their fiscal year ends. For example, the firms whose fiscal years end in April 2000 to March 2001 are categorized in the same year group 2000.

[9] We first apply an OCR (optical character recognition) software to the documents and then collect information on managerial ownership by using a VBA (Visual Basic for Applications) algorithm we develop. The algorithm appears more effective than that from Python programming in the context where Japanese letters are analyzed. We also verify the information with the original documents when errors are generated by the OCR software.

[10] We obtain historical TSE industry codes of a firm from FDS Japanese Listed Stocks Monthly Return Data (code: TSE33). The codes are assigned by Securities Identification Code

firm changes the month in which its fiscal year ends and it does not reach 12 months. We remove firm-years when at least one of the following variables is missing: managerial ownership (*m*), Tobin's *q* (see Appendix B), sales, operating income, tangible assets and capital expenditure (see Appendix A). Finally, we weed out dual-class firms (see Appendix C).[11] As a result, we obtain a sample of 59,064 firm-years for 4,905 unique Japanese listed firms from 2000 to 2017.

2-1-3. Firm value, past liquidity and other variables

We adopt Tobin's *q* as a proxy for firm value, which is conventional (for the estimation, see Appendix B). We use both Amihud's (2002, p. 34) and Fong, Holden and Trzcinka's (2017, p. 1362, hereafter FHT) measures as a proxy for illiquidity (see Appendix A). Most of the other variables adopted in our paper follow MSV, McConnell and Servaes (1990), HHP, Fahlenbrach and Stulz (2009, hereafter FS) and FFST (for the other variables, see Appendix A).[12]

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Committee, and available for all listed firms (except for investment corporations, etc.) on a stock exchange in Japan as well as those listed on TSE.

[11] To issue dual-class stocks, Japanese firms are required to note this in their charters under Japan's Companies Act. We obtain listed firms' charters from PRONEXUS' eol database for the sample period, apply an OCR software, and then collect information about whether a firm is a dual-class firm by applying our algorithm to search for the word (*shuruikabu*), which expresses dual-class stocks. The years succeeding the change to a dual-class firm are excluded unless the firm is specified as a non-dual-class firm by confirming that the word is not included in its charter. We identify 899 firm-years using the algorithm. Dual-class stock separates cash-flow rights from voting rights (Gompers, Ishii and Metrick 2010), and dual-class firms are commonly excluded in the literature in the context (Fahlenbrach and Stulz 2009, p. 346). During the sample period, less than 3% of the observations in a year are removed as dual-class firms (Appendix C(a)), which have statistically significant characteristics (Appendix C(b)). For example, dual-class firms have significantly higher book value of assets and higher ratio of long-term debt to assets than single-class firms (Appendix C(b)).

[12] As is common in the literature, we do not control governance mechanisms by using corporate governance indices, such as G Index (Gompers, Ishii and Metrick 2003) or E Index (Bebchuk, Cohen and Ferrell 2009). Li, Sun and Yannelis (2018, p. 45 Table 8) analyze interaction with alternative governance channels by applying these indices.

2-2. Summary statistics

We first report the summary statistics for the variables adopted in the analysis in Table 1(A). In our sample, the mean and median managerial ownership fractions (*m*) are 8.8% and 2.0%, respectively.[13] This suggests that the distribution is also skewed in Japan as well as in the U.S. (MSV p. 297 Table 1; Li, Sun and Yannelis 2018, p. 7). Those fractions are considerably lower than those in the U.S. (FFST p. 47 Table 1).

Second, we also report the mean values of Tobin's *q*, grouped by level of managerial ownership in Table 1(B). In contrast to American firms (MSV pp. 297-298 Table 1), mean values of Tobin's *q* in all firms are slightly higher when managerial ownership (*m*) is 25% or more (Table 1(B)(a)). This is due to the subset of sample firms called young firms (Table 1(B)(c)), rather than named mature firms (Table 1(B)(d)).[14]

Finally, summary statistics by fiscal year are provided in Table 1(C). Different from American firms (FFST pp. 9, 47 Table 1), it is difficult to discern a clear pattern in the mean and median managerial ownership (*m*) in all firms over the sample period (Table 1(C)(a)). This is also relevant to 500 largest firms (Table 1(C)(b)).[15] The 500 largest firms appear to be listed for a longer period than all firms and are less illiquid in terms of both Amihud and FHT measures

[13] We define a CEO as a director or officer who has the largest ownership fraction for a firm in each year among those who have the title to represent the firm (when two or more are observed, whose term of office as a director or officer is the longest), and find that the mean and median managerial ownership fraction by the single CEO are 6.1% and 0.6%, respectively, suggesting that a considerable amount of managerial ownership is due to the single CEO. Next, we confirm that the results reported in our paper are robust to the effects by corporate governance changes during the sample period. Specifically, numerous directors who do not have the title to represent the firm are changed to employees (whose equity ownership is generally not disclosed and thus not included in our *m* after the change) and a number of statutory auditors (whose ownership is not included in our *m*) become outside directors (whose equity holdings are covered) during the sample period. However, our findings in the paper generally do not meaningfully change even when we adopt the single CEO's ownership fraction as *m*, and they are robust to the effects by such changes in corporate governance.

[14] We divide the sample into two subsets according to the years for which a firm is listed, which is expressed by the variable *years listed* (see Appendix A). A firm-year observation is categorized as either young firms when *years listed* is less than 10 (years), or mature firms when it is 10 or more.

[15] 500 largest firms are selected from the sample in each year in terms of sales.

(Tables 1(C)(a) and 1(C)(b)). Both illiquidity measures significantly decline during the sample period but spiked during the financial crisis 2007-2009, at which point the results are similar between American and Japanese firms (FFST pp. 9-10, 47 Table 1; our Tables 1(C)(a), 1(C)(b), 1(C)(c) and 1(C)(d)). Although mature firms by definition are listed for a longer period, they are not necessarily less illiquid than young firms in both measures depending on a fiscal year (Tables 1(C)(d) and 1(C)(c), respectively).

## 3. Determinants of managerial ownership

### 3-1. Determinants of ownership level

#### 3-1-1. Empirical methodology

The determinants of managerial ownership are reported in this section. To do so, we first follow HHP's (pp. 362-366) approach. Specifically, as in HHP (p. 366), we adopt the following expression for managerial ownership as a baseline model:

$$m_{it} = f\big(LN(S)_{it}, (K/S)_{it}, RDK_{it}, RDUM_{it}, (A/K)_{it}, ADUM_{it}, (I/K)_{it}, (Y/S)_{it}, SIGMA_{it,}\, SIDGUM_{it}\big) + u_i + \eta_{it} \quad (1)$$

where *i* and *t* represent the firm and time, respectively, $u_i$ is the firm-specific effect, and $\eta_{it}$ is the error term. The corresponding variables are described in Appendix A.

#### 3-1-2. Determinants of ownership level

Our estimates of the determinants of managerial ownership (*m*) are reported in Table 2. Following Demsetz and Lehn (1985, p. 1163), *m* is transformed into $LN(m/(1-m))$ as the dependent variable. As in HHP (p. 368 Table 4(A)), in specifications considering firm fixed effects (columns (3) to (5) in our Table 2), we control for the unobserved firm heterogeneity expressed by $u_i$ in Eq. (1).

In the specification using pooled data for all firms, increases in firm size (*LN(S)*) are

associated with an increase in managerial ownership (*m*) at the 5% significance level (column (1) in Table 2), which is also relevant to those whose industry fixed effects are controlled (column (2)). These results are different from the findings reported for American firms (HHP pp. 366, 368 Table 4), however, when we restrict our sample to the 500 largest firms, increases in firm size (*LN(S)*) are associated with a reduction in managerial ownership (*m*) at the 10% significance level (column (4) in our Table 2).

In the specification for all firms controlling for firm fixed effects, although the coefficients of *SIGMA* and *ADUM* are statistically significant, none of the other explanatory variables are statistically significant at the 10% level (column (3) in the same table). The inclusion of firm fixed effects changes the significance of most explanatory variables (columns (1) and (3)), and thus the unobserved firm characteristics are correlated with the observed characteristics, at which point the results are similar to those reported for American firms (HHP p. 368 Table 4, p. 370).

3-1-3. Effects on managerial ownership

The effects of past stock liquidity on managerial ownership are reported in Table 3. We estimate both adjusted FM and OLS regressions, and the specifications in the table are comparable to those of FFST (p. 53 Table 6). For adjusted FM regressions, the reported parameter estimates are time series averages of yearly regression coefficient estimates. Since the existence of autocorrelation in the parameter estimates from year-by-year regressions would bias the statistical significance, following Chakravarty, Gulen and Mayhew (2004, pp. 1249-1250 note 9), we adjust the standard errors for first-order autocorrelation by multiplying the standard errors of the average parameters by $\sqrt{(1+\rho)/(1-\rho)}$, where $\rho$ is the first-order autocorrelation in yearly parameter estimates (hereafter the same applies to all adjusted FM regressions in our paper).[16]

[16] Petersen (2009, p. 465) notes that many authors have suggested adjusting the standard errors for the estimated first-order autocorrelation of the estimated slope coefficients, and the proposed

Both *high liquidity years (FHT)* and *low liquidity years (FHT)* are statistically significant at the 1% level, no matter whether year fixed effects are controlled (columns (5) to (8) in our Table 3), and the positive or negative signs of the coefficients are opposite to those reported for American firms (FFST p. 53, columns (5) to (8) in Table 6). Our results suggest that Japanese firms with a history of high or low liquidity have significantly higher or lower managerial ownership (*m*), respectively, which is in marked contrast to the findings on American firms.

3-2. Ownership structure following an IPO

Apart from the analysis based on HHP's (pp. 362-366) specification, distribution of changes in *m* in the years after an IPO is presented graphically in Figure 1. The median managerial ownership (*m*) constantly declines following an IPO, and the percentage of widely held firms continuously increases for at least 15 years after an IPO (Figure 1). The result is consistent with that of Helwege, Pirinsky and Stulz (2007, p. 1007 Figure 3), except that Japanese firms appear widely held in a shorter period of time than American firms, regardless of whether we define "widely held" as *m* less than 10% or 20% (Helwege, Pirinsky and Stulz 2007, p. 1007 Figure 3; our Figure 1). Such changes in *m* over time after an IPO appear to be associated with the difference in the distribution of *m* between young and mature firms (Tables 1(B)(c) and 1(B)(d)).

3-3. Large changes in managerial ownership

3-3-1. Empirical methodology

Considering the findings reported in this section, we further clarify determinants of

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adjustment is to estimate the correlation between the yearly coefficient estimates (i.e., Corr[$\beta_t$, $\beta_{t-1}$] = $\rho$), and then multiply the estimated variance by $(1+\rho)/(1-\rho)$ to account for the serial correlation of the $\beta$s. Our adjustment is the same. Our adjustment is also consistent with that of FFST. Specifically, FFST (p. 11) estimate a first-order autoregressive model for each coefficient and then use the estimated autoregression coefficients to adjust the FM standard errors.

managerial ownership by focusing on a large change (drop or increase) in *m*. As in FS (p. 346), we define a large drop or increase as a change in *m* larger than 2.5% in absolute value. Approximately 9% of firm-years experiences such large changes in *m* (Table 4(A)), while on average, about a third of American firms do so in a year (FS p. 346).

As in FS (p. 346), to investigate the extent to which changes in *m* in excess of 2.5% in absolute value explain the variation in changes in *m*, we also estimate (but do not report) the following regression for each year of the sample period:

$$\begin{aligned} Change\ in\ ownership_{it} = c\ &+ \beta \times Change\ in\ ownership_{it} | Change \\ &< -2.5\% + \gamma \times Change\ in\ ownership_{it} | Change > 2.5\% + \eta_{it} \end{aligned} \tag{2}$$

The *R*-squared of the regression exceeds 98.3% each year, which is similar to the results for American firms (98%, FS p. 347). Therefore, as for American firms, the changes in *m* are mostly explained by large changes.

We further follow Helwege, Pirinsky and Stulz's (2007, p. 1009 Eq. (1)) decomposition and FS' (p. 352 Table 4) approach. Specifically, we also adopt the following equation for decomposing changes in *m*:

$$\Delta m_t = \left(\frac{S_{t+1}}{N_{t+1}}\right) - \left(\frac{S_t}{N_t}\right) = \frac{\Delta S}{N_t} - m_{t+1}\frac{\Delta N}{N_t} \tag{3}$$

where $\Delta m_t$ is defined as the change in *m* from $t$ to $t+1$, $S_t$ is the number of shares held by managers at date $t$ and $N_t$ is the firm's number of shares outstanding at date $t$. As in Helwege, Pirinsky and Stulz (2007, pp. 1009-1010), the term $\frac{\Delta S}{N_t}$ in Eq. (3) represents the change in *m* explained by a change in the number of shares held by managers (the numerator change), and the term $-m_{t+1}\frac{\Delta N}{N_t}$ is the change in *m* caused by a change in the number of shares outstanding (the denominator change).

3-3-2. Results

Our results are reported in Tables 4(A) and 4(B). Consistent with the findings for ownership structure following an IPO (Section 3-2), young firms are more likely to experience a large drop in managerial ownership (*m*) than mature firms (Table 4(A)). Young firms are also more likely to have a large increase in *m* than mature firms (the same table).

We further report marginal effects of probit regressions of both a) large decreases and increases in *m* and b) the decomposition of the large decreases and increases on changes in explanatory variables in Table 4(B). Columns (1) and (4) in the table correspond to columns (1) and (2) in FS (p. 351 Table 3), and columns (2) to (3) and (5) to (6) are closely equivalent to columns (1) to (4) in FS (p. 352 Table 4).

The results show that a firm's concurrent industry-adjusted stock returns are strongly significant predictors of large decreases in *m* (column (1) in Table 4(B)), which is consistent with the findings on American firms (FS pp. 350, 351 column (1) in Table 3). This is due to the subset of young firms rather than mature firms (columns (7) and (9) in our Table 4(B)). In contrast to American firms (FS p. 351 column (1) in Table 3), a Japanese firm's concurrent market returns are also strongly significant predictors of large decreases in *m* (columns (1) and (7) in our Table 4(B)).

The overall results appear broadly similar between young and mature firms (columns (7) to (10) in Table 4(B)), however, the major differences include the strong significance of concurrent industry-adjusted and market returns and lagged industry-adjusted returns in predicting a large drop in *m* for young firms (columns (7) and (9)). In an unreported table, we find that concurrent and lagged industry-adjusted returns are strongly significant predictors of a large drop in *m* for young firms caused by either a numerator decrease or a denominator increase, suggesting that managers at a young firm (meaning during the period following an IPO) tend to reduce their equities and also increase its shares outstanding when those returns are high. By contrast, those returns are not significant predictors of a large drop in *m* for mature firms

(column (9)).

Consistent with the findings on American firms (FS pp. 350-351, p. 351 Table 3), large decreases and increases in *m* are more likely if the level of *m* is high, and the probability of a large decrease and increase in *m* is negatively associated with the change in *m* in the previous year (columns (1) and (4) in our Table 4(B)).

Different from what is reported for American firms (FS p. 351 Table 3), Japanese firms that become financially constrained are more likely to experience a large decrease or increase in *m* (columns (1) and (4) in our Table 4(B)), whereas financial constraints are not significant predictors of a large decrease in *m* for American firms (FS p. 351 Table 3).[17] For Japanese firms, the fact that a firm become financially constrained is a strongly significant predictor of both a) a large drop in *m* caused by either a numerator decrease or a denominator increase and b) a large increase in *m* due to either a numerator increase or a denominator decrease (columns (2), (3), (5) and (6) in our Table 4(B)).

## 4. Managerial ownership and Tobin's *q*: Evidence from 2000 to 2017

### 4-1. Empirical methodology

The determinants of Tobin's $q$ are analyzed in this section. To do so, we again fundamentally follow HHP's (pp. 371-381) approach. Specifically, as shown in HHP (p. 359), we adopt the following expression for firm value as a baseline model:

$$q_{it} = \delta y_{it} + \beta x_{it} + \gamma u_i + w_{it} \tag{4}$$

[17] The presence and importance of financial constraints have been studied for American firms (Fazzari, Hubbard and Petersen 1988), while an index expressing financial (un)constraints is not established for Japanese firms, and we adopt a no-dividend dummy in the analysis (see Appendix A). This appears related to the fact that it is not feasible to analyze managers' discussion of liquidity that describes the firm's future needs for funds and the source it plans to use to meet those needs, as in Kaplan and Zingales (1997, p. 170), because such information is usually not disclosed in Japanese Annual Securities Reports. In this respect, Whited and Wu (2006, p. 541 Table 1) report their Euler-equation estimation results for American firms. Hadlock and Pierce (2010, p. 1929) is a more recent development for American firms.

where $q_{it}$ is the value of firm $i$ at time $t$ and $y_{it}$ is an optimal "effort level" chosen by managers, which depends on managerial ownership $m_{it}$. $x_{it}$ and $u_i$ are observed and unobserved characteristics of the firm, respectively. We also adopt variants of the Eq. (4).

4-2. Results

4-2-1. Introduction

Our estimates of the determinants of Tobin's $q$ are reported in Table 5. The dependent variable is Tobin's $q$. The estimates of adjusted FM and OLS regressions are reported in Tables 5(A) and 5(B), respectively, corresponding to FFST (p. 48 Table 2 Panel A and p. 49 Table 2 Panel B, respectively). Quadratic specifications are adopted in Table 5(C)(a), corresponding to HHP (pp. 374-375 Table 5(A)) and spline specifications are used in Table 5(C)(b), corresponding to HHP (pp. 376-377 Table 5(B)).

In all specifications in Table 5, explanatory variables include HHP control variables, in addition to the $m_{it}$ in Eq. (4), as expressed by *m* (linear specifications) in columns (1), (4), (7) and (10) in Tables 5(A) and 5(B), by *m* and *m^2* (meaning $m^2$) (quadratic specifications) in columns (3), (6), (9) and (12) in Tables 5(A) and 5(B) and in Table 5(C)(a) or by *m1*, *m2* and *m3* (spline specifications) in columns (2), (5), (8) and (11) in Tables 5(A) and 5(B) and in Table 5(C)(b).[18]

In Table 5(A) adopting adjusted FM regressions, year fixed effects are not controlled, but industry fixed effects are considered. In Table 5(B) based on OLS regressions, both year and

[18] The piecewise-linear terms (*m1*, *m2* and *m3*) are adopted by MSV (p. 298), and McConnell and Servaes (1990, p. 601) propose the quadratic specifications (*m* and *m^2*). The piecewise-linear terms allow for slopes to change at 5% and 25%. We adopt the same numbers for the purpose of comparing Japan with the U.S., and the similarities between the estimates adopting those specifications in all, young and mature firms (Figures 2(A)(a), 2(A)(c) and 2(A)(d), respectively) suggest that the numbers are appropriate for Japanese firms. Although MSV (p. 298) document that the theoretical justification for these particular numbers is not very strong, one reason for adopting the 5% ownership level is relevant to Japan, in that it is also used as a point of mandatory public disclosure of ownership under Japan's Financial Instruments and Exchange Act (for the U.S., see MSV pp. 298-299).

industry fixed effects are controlled. In all columns from (1) to (3) in Tables 5(C)(a) and 5(C)(b), year fixed effects are controlled, and industry or firm fixed effects are also considered where indicated.

4-2-2. Adjusted Fama-MacBeth and OLS regressions

Turning to the adjusted FM regressions in Table 5(A), the linear specifications (*m*) are statistically significantly positive at the 1% level in all firms (column (1)). Said differently, the simple linear relation between managerial ownership (*m*) and Tobin's *q* is strongly significantly positive, which is opposite to the findings on American firms (FFST p. 48 Table 2 Panel A columns (1) and (4)). The result is due to the subset of young firms (column (7) in our Table 5(A)), rather than mature firms in which the coefficient of *m* is negative and statistically indistinguishable from zero (column (10)).

When we decompose the linear relation by spline specifications (*m1*, *m2* and *m3*), the relations between the first variable (*m1*) and Tobin's *q* become negative at the 1% significance level, and those between the second variable (*m2*) and *q* remain strongly significantly positive in all firms (column (2) in Table 5(A)). The results are also relevant to the 500 largest firms (column (5)).

The main implications hold when we use OLS regressions controlling for both fixed year and industry effects and adopting standard errors robust to both clustering at firm-level and heteroscedasticity, except that the statistical significance on the relation between managerial ownership and Tobin's *q* disappears in the 500 largest firms (columns (4) to (6) in Table 5(B)), which is similar to the results for American firms (FFST p. 49 Table 2 Panel B columns (4) to (6)).

Figure 2(A) draws the relation between managerial ownership and Tobin's *q* as implied by our estimates reported in Table 5(A), which is comparable to FFST (p. 34 Figure 2, p. 35 Figure 3). FFST (in the abstract, pp. 27-28, p. 34 Figure 2, p. 35 Figure 3) show that the relation between a firm's managerial ownership and Tobin's *q* is systematically negative, and

when they restrict their sample to larger firms, their findings are consistent with the past literature, showing an increasing and concave relation between managerial ownership and Tobin's *q*. American and Japanese firms are relatively similar in their 500 largest firms in that the hump-shaped relation is observed in the spline specifications (FFST p. 35 Figure 3; our Figure 2(A)(b)), at which point our analysis is consistent with the prior literature on American firms. However, in all Japanese firms, the relation between a firm's managerial ownership and Tobin's *q* is positive in general (Figure 2(A)(a)). In other words, the relation appears relatively similar between American and Japanese larger firms but different among all firms, and the difference is the key to the issue.

We find that the positive relation in all firms is due to the subset of young firms (Figure 2(A)(c)) rather than mature firms (Figure 2(A)(d)). Young firms are still in the process of being widely held (Figure 1), and young firms are more likely to be in the range of 25% or more in managerial ownership (*m*) than mature firms (Tables 1(B)(c) and 1(B)(d)). These young firms with high *m* appear to have higher Tobin's *q* than other young firms or mature firms (Tables 1(B)(c) and 1(B)(d)), and the distribution appears to contribute to the positive shape in all firms (Figure 2(A)(a)).

We also learn that the relation between a firm's managerial ownership and Tobin's *q* is partly negative in all firms when spline specifications are deployed and managerial ownership is 5% or less (the coefficient of the ownership term *m1* is statistically significant at the 1% level. column (2) in Table 5(A), Figure 2(A)(a)). The statistically significant partial negative relation is observed in all firms because of the subset of mature firms (column (11) in Table 5(A), Figure 2(A)(d)). This suggests that, considering the number of firm-years grouped by level of *m* (Tables 1(B)(a), 1(B)(c) and 1(B)(d)), the relation between managerial ownership (*m*) and Tobin's *q* in all firms is mostly determined by mature firms when ownership is 5% or less (expressed by the term *m1*), and is impacted by young firms when it is more than 5% (*m2* and *m3*) (columns (2), (8) and (11) in Table 5(A), Figures 2(A)(a), 2(A)(c) and 2(A)(d)). These findings are robust to the inclusion of year fixed effects and the adoption of standard errors robust to both clustering at

firm-level and heteroscedasticity (columns (2), (8) and (11) in Table 5(B)).

4-2-3. Managerial ownership and Tobin's *q* conditioning on past liquidity

FFST (in the abstract, pp. 27-28) also document that their seemingly contradictory results are explained by cumulative past performance and liquidity. Specifically, FFST (p. 28) observe that illiquid firms are more likely to be low-Tobin's *q* firms with high managerial ownership.

Thus, we report our estimates of managerial ownership and Tobin's *q* conditioning on past liquidity (Table 6), which is comparable to those of FFST (p. 51 Table 4). We also estimate Tobin's *q* on the subset of firms with the highest and lowest past liquidity (FFST p. 18; our Table 6). We find that, in Japanese firms, the quadratic terms (*m* and *m^2*) are statistically strongly significant in the low liquidity columns (columns (3), (4), (7) and (8) in Table 6), and the positive and negative signs of those terms are the same between American and Japanese firms when those terms are statistically significant in both (FFST p. 51 Table 4; our Table 6).

The results show that the relation between a firm's managerial ownership and Tobin's *q* is also different in Japanese firms depending on the liquidity history (Table 6). For firm-years in the low liquidity bracket, the relation is inversely hump-shaped and mostly negative, no matter whether Amihud or FHT illiquidity measures are used (columns (3), (4), (7) and (8) in the same table). In other words, the firm-years in the low liquidity bracket have a different relation between managerial ownership and Tobin's *q* compared to those in the high liquidity bracket, at which point American and Japanese firms are similar (FFST pp. 18, 51 Table 4; our Table 6).

4-2-4. The effect of ownership change on Tobin's *q*

We consider the effect of ownership change on Tobin's *q* in OLS regressions, while controlling for fixed year and industry effects (Table 7). The explanatory variable *ownership change* is defined as the difference between initial *m* (first observation for a firm) and present *m* lagged by one period. A positive *ownership change* means a decline in *m* over the period.

The coefficient of the variable *ownership change* is significantly positive at the 1% level in all firms (column (1) in Table 7), suggesting that the decline in managerial ownership from the first year to the last is associated with higher Tobin's *q* in the current year. The result holds when we restrict our sample to the subset of young firms, mature firms or firms that experience an IPO during the sample period (columns (2), (3) and (4), respectively). These findings are consistent with those of American firms (FFST p. 52 Table 5).[19]

4-2-5. Impacts of fixed effects

We further clarify the impacts of fixed effects on the relation between managerial ownership and Tobin's *q* in panel regressions (Table 5(C)).

Simply put, we confirm that the significant relation becomes less strong when we control for both fixed year and firm effects in the fixed effects model (columns (3) in Tables 5(C)(a) and 5(C)(b)). This is similar to what is reported for American firms (HHP p. 372), in which the managerial ownership variables are significant only in the pooled model with no other variables and in the model with only industry fixed effects (HHP pp. 372, 374-375 Table 5(A)).[20]

4-3. Robustness

In the spirit of FFST (pp. 13-15, p. 50 Table 3), we report results of additional robustness tests in Table 5(D). In column (2), we add industry x year fixed effects to the regression in column (1), and the results confirm that allowing industry effects to vary by year has almost no impact on our estimates. Next, as in Gompers, Ishii and Metrick (2010, p. 1069),

[19] Unreported robustness tests confirm that the coefficients remain strongly significantly positive for all firms and in the subsets of young firms, mature firms and firms that experience an IPO during the sample period when we estimate Tobin's *q* as median regressions, or adopt a log transformation or -1/*q* transformation, meaning that the results are robust to both measurement error and the influence of outliers (for the robustness tests, see Section 4-3).

[20] MSV (p. 293) find that Tobin's *q* first increases, then declines, and finally rises as managerial ownership increases. HHP (pp. 372-373) document that the MSV's specification is robust to the inclusion of observable contracting determinants and industry dummies, but once they control for both observable firm characteristics and firm fixed effects, changes in managerial ownership levels have no statistically significant effect on Tobin's *q*.

we estimate three different variations of our specification. The first variation deploys robust regression to deal with measurement error, to which estimates of Tobin's $q$ are subject, by estimating a median regression in which the sum of absolute residuals is minimized and which is less sensitive to outliers (column (3) in Table 5(D)).[21] The second variation adopts a log transformation to reduce the influence of outliers (column (4) in the same table). The third variation uses $-(1/q)$ as the dependent variable (column (5)). The coefficients of the ownership terms (*m1*, *m2* and *m3*) are qualitatively similar, and all the coefficients are statistically significant at the 1% level (columns (1) to (5)). The results confirm that our findings reported in Section 4-2-2 are robust to both the measurement error and the influence of outliers.[22]

Furthermore, we graphically show the relation between managerial ownership and Tobin's $q$ estimated by median regressions (Figure 2(B)). Consistent with the results of our robustness tests (Table 5(D)), the figures are similar to those grounded on our main results (Figures 2(B) and 2(A), respectively), except that the hump-shaped relation in the 500 largest firms in spline specifications is less clearly observed (Figures 2(A)(b) and 2(B)(b)), and the relation becomes virtually similar to that of mature firms (Figures 2(B)(b) and 2(B)(d), respectively).

Finally, in the spirit of FFST (p. 15), we estimate OLS regressions for three different subperiods of six years each (unreported). We find that the simple linear relation between *m* and Tobin's $q$ is significantly positive at the 1% level in each subperiod. The results further confirm that the relation observed in the spline specifications is qualitatively similar to that in our main estimates in each subperiod, and the coefficients are often strongly significant (the signs of the

[21] Considering the point raised by Gormley and Matsa (2014, p. 617) that demeaning the dependent variable with respect to the group produces inconsistent estimates and can distort inference, we do not use industry-adjusted Tobin's $q$ in our median regressions.

[22] Unreported robustness tests further confirm that the relation between managerial ownership and Tobin's $q$ often becomes stronger in statistical significance in young and mature firms when Tobin's $q$ is estimated as median regressions or when a log transformation or -1/$q$ transformation is used.

coefficients of *m1*, *m2* and *m3* are the same as those in columns (2) in Tables 5(A) and 5(B)).

4-4. Brief summary

Overall, we find that, the relation between managerial ownership and Tobin's *q* is relatively similar between American and Japanese larger firms in that the hump-shaped relation is observed in the spline specifications (FFST p. 35 Figure 3; our Figure 2(A)(b)), at which point our analysis is consistent with the prior literature on American firms.

However, in all Japanese firms, the relation between a firm's managerial ownership and Tobin's *q* is positive in general (Figure 2(A)(a)), and the positive relation is robust to both the measurement error and the influence of outliers. In other words, American and Japanese firms appear relatively similar in their 500 largest firms but different for all firms, and the difference is the key to the issue. We find that the positive relation in all firms is due to the subset of young firms (Figure 2(A)(c)) rather than mature firms (Figure 2(A)(d)). Young firms with high *m* appear to have higher Tobin's *q* than other young firms or mature firms (Tables 1(B)(c) and 1(B)(d)), and the fact that more firms are distributed in the range of 25% or more in *m* in young firms than in mature firms appears to contribute to the positive shape in all firms (Figure 2(A)(a)). The results suggest that the fraction of newly listed firms is a decisive factor in the relation between managerial ownership and firm value in all firms.

5. External validities of the theories and empirical evidence on American firms

Jensen and Meckling (1976, p. 305) defined the concept of agency costs, in relation to the "separation and control" issue. It seems reasonable to assume that if managers are well incentivized to maximize firm value by holding equities of the firm, then their equity ownership probably has positive effects on the value of the firm. Past studies abound on American firms, which are primarily on a small number of the largest firms. However, by using more than 50,000 firm-years from 1988 to 2015, the recent work FFST show that the relation between a firm's managerial ownership and Tobin's *q* is systematically negative, and by doing so corrects those

shortcomings.

Although the number of equities owned by managers of listed firms is disclosed and the information is available as data, the literature on Japanese firms analyzing the relation between managerial ownership and Tobin's *q* is scarce. To the best of our knowledge, our paper is the first to analyze Japanese firms in large datasets and clarify the relevance and external validity of the theories and empirical evidence in the context of American firms.

American and Japanese firms are relatively similar in that, for their 500 largest firms, the hump-shaped relation is observed in the spline specifications (FFST p. 35 Figure 3; our Figure 2(A)(b)), at which point our analysis is consistent with the prior literature on American firms. However, in all Japanese firms, the relation between a firm's managerial ownership and Tobin's *q* is positive in general (Figure 2(A)(a)), and the positive relation is robust to both the measurement error and the influence of outliers (Figure 2(B)(a)). In other words, American and Japanese firms appear relatively similar in their 500 largest firms but are different in all firms, and the difference is the key to the issue.

We find that the positive relation in all firms is due to the subset of young firms (Figure 2(A)(c)). Young firms with high managerial ownership (*m*) appear to have higher Tobin's *q* than other young firms or mature firms (Tables 1(B)(c) and 1(B)(d), respectively), and the fact that more firms are distributed in the range of 25% or more in *m* in young firms than in mature firms appears to contribute to the positive shape for all firms (Figure 2(A)(a)). The general reduction in *m* after an IPO is the primary factor contributing to the change in *m* (Figure 1, Table 4(A)). Concurrent industry-adjusted and market returns and lagged industry-adjusted returns are strongly significant predictors of a large drop in *m* for young firms (column (7) in Table 4(B)). The results suggest that the fraction of newly listed firms is a decisive factor in the relation between managerial ownership and firm value.

Different from what is reported for American firms (FS p. 351 Table 3), Japanese firms that become financially constrained are more likely to experience a large decrease or increase in managerial ownership (*m*) (columns (1) and (4) in our Table 4(B)), whereas financial constraints

are not significant predictors of a large decrease in *m* for American firms (FS p. 351 Table 3).

Our results suggest that Japanese firms with a history of high or low liquidity have significantly higher or lower managerial ownership (*m*) when controlling for fixed year and industry effects (columns (2), (4), (6) and (8) in Table 3), which is in marked contrast to the findings on American firms. However, the relation between a firm's managerial ownership and Tobin's *q* is different in both American and Japanese firms depending on the liquidity history (Table 6). For firm-years in the low liquidity bracket, the relation is inversely hump-shaped and mostly negative (columns (3), (4), (7) and (8) in Table 6). The result shows that the firm-years in the low liquidity bracket have a different relation between managerial ownership and Tobin's *q* compared to those in the high liquidity bracket, at which point American and Japanese firms are similar (FFST pp. 18, 51 Table 4; our Table 6).

Our results also confirm that the significant relation becomes less strong when we control for both fixed year and firm effects in the fixed effects model (columns (3) in Tables 5(C)(a) and 5(C)(b)). It is similar to what is reported for American firms (HHP p. 372).

## 6. Conclusion

We focus on Japanese listed firms in the context of the relation between managerial ownership and Tobin's *q*. By using 59,064 firm-years of 4,905 unique Japanese firms from 2000 to 2017, we find that the relation between a firm's managerial ownership and Tobin's *q* is positive in general (Figure 2(A)(a)). The positive relation is robust to both the measurement error and the influence of outliers, and it is due to the subset of young firms (Figure 2(A)(c)). Young firms with high managerial ownership (*m*) appear to have higher Tobin's *q* than other young firms or mature firms (Tables 1(B)(c) and 1(B)(d), respectively), and the fact that more firms are distributed in the range of 25% or more in *m* in young firms than in mature firms appears to contribute to the positive shape for all firms (Figure 2(A)(a)). The general reduction in managerial ownership (*m*) after an IPO is the primary factor contributing to the change in *m* (Figure 1, Table 4(A)). Concurrent industry-adjusted and market returns and lagged

industry-adjusted returns are strongly significant predictors of a large drop in *m* for young firms (column (7) in Table 4(B)). The results suggest that the fraction of newly listed firms is a decisive factor in the relation between managerial ownership and firm value. When we restrict our sample to the 500 largest firms, the hump-shaped relation is observed in the spline specifications (Figure 2(A)(b)), at which point our analysis is consistent with the prior literature on American firms.

Our results suggest that Japanese firms with a history of high or low liquidity have significantly higher or lower managerial ownership (*m*), when controlling for both fixed year and industry effects, which is in marked contrast to the findings on American firms. However, the relation between a firm's managerial ownership and Tobin's *q* is different in both American and Japanese firms depending on the liquidity history (Table 6). For firm-years in the low liquidity bracket, the relation is inversely hump-shaped and mostly negative (columns (3), (4), (7) and (8) in Table 6). The result shows that the firm-years in the low liquidity bracket have a different relation between managerial ownership and Tobin's *q* compared to those in the high liquidity bracket, at which point American and Japanese firms are similar (FFST pp. 18, 51 Table 4; our Table 6).

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Appendix A. Variable descriptions

| Variables | Descriptions | Data sources and codes |
|---|---|---|
| Firm value and ownership-related variables | | |
| *Tobin's q* | See Appendix B. | |
| *m* | The total equity holdings of managers as a fraction of common equity outstanding. The managers are directors (including outside directors) and officers (*shikkōyaku*). Employees (*shikkōyakuin*) or statutory auditors (*kansayaku*) are not included. | Nikkei Directors and Officers data (*yakuin* data) (details information column No. 30), Annual Securities Reports derived from PRONEXUS' eol database, and FDS Japanese Listed Stocks Monthly Return Data (CMSHARE) |
| *m^2* | The square of *m* | Same as above |
| *m1* | Equals *m* if 0.00 < *m* < 0.05; 0.05 if *m* >=0.05 | Same as above |
| *m2* | Equals *m* -0.05 if 0.05 < *m* < 0.25; 0.00 if *m*<=0.05; 0.20 if *m* >=0.25 | Same as above |
| *m3* | Equals *m* -0.25 if 0.25 < *m* < 1.00; 0.00 if *m*=< 0.25 | Same as above |
| *Ownership change* | The difference between initial *m* (observation reported in the year of an IPO or the first observation during the sample period) and present *m* lagged by one period | Same as above plus a list of IPO stocks provided by FDS, which is part of the Japanese Listed Stocks Daily Return Data |
| HHP control variables | | |
| *LN(S)* | The natural log of sales | Nikkei FQ (D01021) |
| *(LN(S))^2* | The square of *LN(S)* | Same as above |
| *K/S* | The ratio of tangible assets to sales | Nikkei FQ (D01021, B01063) |
| *(K/S)^2* | The square of *K/S* | Same as above |
| *Y/S* | The ratio of operating income to sales | Nikkei FQ (D01029, D01021) |
| *RDK* | The ratio of research and development expenditures to tangible assets | Nikkei FQ (H01033, B01063) |
| *RDUM* | A dummy variable equal to one if the data required to estimate *RDK* is available, and otherwise equal to zero. As in HHP (p. 367 Table 3), we set missing observations of *RDK* equal to zero, and then include this dummy variable to allow the intercept term to capture the mean of the *RDK* for missing values. | Same as above |
| *A/K* | The ratio of advertising expenditures to tangible assets | Nikkei FQ (K01069, B01063) |
| *ADUM* | A dummy variable equal to one if the data required to estimate *A/K* is available, and otherwise equal to zero (see the description of *RDUM*) | Same as above |
| *I/K* | The ratio of capital expenditures to tangible assets | Nikkei FQ (A01143, B01063) |
| *SIGMA* | The standard error of the residuals from a CAPM model estimated using daily data for the period covered by the annual sample | FDS FF3 Extended Market (Rm, Rf), Japanese Listed Stocks Daily Return Data (ROR) |
| *SIGDUM* | Equal to one if the data required to estimate *SIGMA* is available, and otherwise equal to zero (see the description of *RDUM*) | Same as above |

Appendix A. Continued.

| | | |
|---|---|---|
| **FS explanatory variables** | | |
| *R&D/assets* | The ratio of research and development expenditures to book value of assets | Nikkei FQ (H01033, B01110) |
| *log (assets)* | The natural log of book value of assets | Nikkei FQ (B01110) |
| *capex/assets* | The ratio of capital expenditures to book value of assets | Nikkei FQ (A01143, B01110) |
| *cash flow* | EBITDA over sales | Nikkei FQ (D01066, D01047, H01005, D01021) |
| *PPE/assets* | The ratio of tangible assets to book value of assets | Nikkei FQ (B01063, B01110) |
| *leverage* | Long-term debt plus short-term debt over book value of assets | Nikkei FQ (C01021, C01057, B01110) |
| *financially (un)constrained* | A dummy variable equal to one if a firm does not pay a dividend and zero otherwise | Nikkei FQ (I_A01173, A01140) |
| *turnover* | Annualized daily turnover at the principal market for each stock | FDS Japanese Listed Stocks Daily Return Data (VOLUME, CMSHARE) |
| *idiosyncratic volatility* | The standard deviation of the residuals from a CAPM model estimated using daily data for the period covered by the annual sample | FDS FF3 Extended Market (Rm, Rf), Japanese Listed Stocks Daily Return Data (ROR) |
| *industry-adj. return* | The annual stock return of a firm adjusted by industry average | FDS Japanese Listed Stocks Monthly Return Data (ADJ_CLOSE_P, TSE33, NKCODE: from IDX1001 to IDX1033) |
| *market return* | The annual stock return of the market | FDS Japanese Listed Stocks Monthly Return Data (ADJ_CLOSE_P, NKCODE: IDX1082) |
| *change in CEO* | A dummy variable equal to one if a manager who has the title to represent the firm is newly appointed or resigned (including a remaining director newly obtaining or losing the title), and otherwise equal to zero | Nikkei Directors and Officers data (details information column No. 11), Annual Securities Reports derived from PRONEXUS' eol database |
| *analyst coverage* | The average number of analysts that follow a firm during the fiscal year. As in FS (p. 350), we set the number of analysts to zero if a firm is not covered by analysts. | I/B/E/S summary database (NUMEST) |
| **Other variables** | | |
| *Years listed* | The difference between the first date on which a firm's stock price is available in the data provided by FDS (Japanese Listed Stocks Daily Return Data, starting from December 28, 1976) and the date on which the firm's fiscal year ends | FDS Japanese Listed Stocks Daily Return Data, the list of IPO stocks provided by FDS |
| *Amihud* | The illiquidity measure proposed by Amihud (2002). *Amihud* is defined as $Amihud = 1 / D_{iy} \sum_{t=1}^{D_{iy}} \lvert R_{iyd} \rvert / VOLD_{iyd}$ where $D_{iy}$ is the number of days for which data are available for stock $i$ in year $y$, $\lvert R_{iyd} \rvert$ is the absolute return on stock $i$ on day $d$ of year $y$, and $VOLD_{iyd}$ is the respective daily volume in yen (Amihud 2002, p. 34). | FDS Japanese Listed Stocks Daily Return Data (ROR, CMSHARE, VOLUME) |
| *FHT* | The illiquidity measure proposed by FHT. *FHT* is defined as $FHT = 2\sigma N^{-1}\left(\frac{1+z}{2}\right)$ where $N^{-1}$ is the inverse cumulative normal distribution function, and $z$ is the number of zero return days divided by the sum of the numbers of trading days and no-trade days (FHT, p. 1362). | FDS Japanese Listed Stocks Daily Return Data (ROR) |

For ownership variables (*m*, *m^2*, *m1*, *m2* and *m3*) and HHP's control variables, see HHP (p. 367). For FS explanatory variables, see FS (p. 351 Table 3, p. 352 Table 4).

Appendix B. Estimation of Tobin's *q*

As is common in the literature, we follow Kaplan and Zingales' (1997, p. 177) method for the estimation of Tobin's *q*.[23] More specifically, we measure Tobin's *q* as the market value of assets divided by the book value of assets where the market value of assets equals the book value of assets plus the market value of common equity less the sum of the book value of common equity and balance sheet deferred taxes.[24] We calculate *q* at the end of a firm's fiscal year.

Estimation

| Concepts | Data sources, codes and/or descriptions |
|---|---|
| the book value of assets | Nikkei FQ (B01110 [total assets]) |
| the market value of common equity | Nikkei FQ (A01057 [the number of shares issued at the end of period]) multiplied by the stock price provided by Financial Data Solutions (CLOSE_P [Japanese Listed Stocks Daily Return Data]) |
| the book value of common equity | the sum of Nikkei FQ (C01085 [capital stock], C01087 [capital surplus], C01092 [retained earnings], C01097 [treasury stock], and C01104 [non-controlling interests]) |
| balance sheet deferred taxes | the sum of Nikkei FQ (B01054 [deferred tax assets], B01098 [deferred tax assets], B01099 [deferred tax assets for land revaluation], C01044 [deferred tax liabilities], C01073 [deferred tax liabilities] and C01074 [deferred tax liabilities for land revaluation]) |

For the estimation, we treat Tobin's *q* as a missing value if at least one of the following four variables is missing: Nikkei FQ codes B01110 [total assets],[25] A01057 [the number of shares issued at the end of period], C01085 [capital stock] and FDS Japanese Listed Stocks Daily Return Data code CLOSE_P [stock closing price]. Following McConnell and Servaes (1990, p. 600), we delete nonfinancial firms with Tobin's *q* greater than 6.0 to preclude problems with outliers. We also treat negative Tobin's *q* as a missing value. We exclude firm-years with missing Tobin's *q*.

[23] Hoshi and Kashyap (1990, pp. 390-398) construct a tax-adjusted *q* for Japanese firms, while maintaining Hayashi's (1982) assumptions which guarantee the equality of marginal and average *q*. Hayashi and Inoue (1991, pp. 737-739) measure an asset-aggregated, tax-adjusted *q* for Japanese firms.

[24] We do not follow Peters and Taylor's (2017, p. 256) method because the amount of past intangible investments, which is needed to calculate internally created intangible capital, is not generally disclosed or available for Japanese firms.

[25] Furthermore, we require firms to have total assets greater than zero.

Appendix C. Single and dual-class firms

(a) Number of single and dual-class firms

This table reports the number of single and dual-class firms during the sample period. We exclude dual-class firms from the sample.

| | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Number of single-class firms | 2,867 | 3,007 | 3,189 | 3,180 | 3,152 | 3,247 | 3,329 | 3,401 | 3,390 | 3,298 | 3,195 | 3,126 | 3,097 | 3,047 | 3,082 | 3,156 | 3,187 | 3,169 |
| Number of dual-class firms | 5 | 9 | 16 | 34 | 35 | 61 | 62 | 59 | 62 | 73 | 70 | 70 | 70 | 67 | 60 | 54 | 50 | 42 |

(b) Summary statistics

In the spirit of Gompers, Ishii and Metrick (2010, p. 1059 Table 3), this table gives means and medians of three variables for single and dual-class firms.

| | Dual-class firms | | | Single-class firms | | | Difference | |
|---|---|---|---|---|---|---|---|---|
| | Obs. | Mean | Median | Obs. | Mean | Median | Mean | Median |
| *Asssets* | 899 | 4,757 | 520 | 57,119 | 1,862 | 286 | -2,895 *** | (0.0000) |
| *Debt/Assets* | 896 | 0.25 | 0.23 | 56,523 | 0.16 | 0.13 | -0.09 *** | (0.0000) |
| *Age* | 899 | 11.14 | 50.98 | 57,119 | 30.66 | 51.74 | 19.52 *** | (0.9953) |

*Assets* is the book value of assets in 100 million yen (Nikkei FQ code B01110 [total assets]); *Debt/Assets* is the ratio of long-term debt (Nikkei FQ code C01057 [noncurrent liabilities]) to *Assets*; *Age* is firm age in years, which is defined as the difference between the date on which a firm was established (Nikkei FQ code PRMTD1 [actual date of foundation]) and the date on which the firm's fiscal year ends. Significant differences for the means are indicated at the 1% level by ***. The Wilcoxon rank-sum test *p*-values for the medians are given in parentheses in the eighth column.

Table 1. Summary statistics

(A) Summary statistics for the variables in the analysis

The table reports the summary statistics for the variables adopted in the analysis.

| | Obs. | Mean | S.D. | p10 | p50 | p90 |
|---|---|---|---|---|---|---|
| Firm value and ownership-related variables | | | | | | |
| *Tobin's q* | 59,064 | 1.142 | 0.661 | 0.669 | 0.967 | 1.748 |
| *m* | 59,064 | 0.088 | 0.135 | 0.001 | 0.020 | 0.286 |
| HHP control variables | | | | | | |
| *LN(S)* | 59,064 | 10.400 | 1.652 | 8.448 | 10.280 | 12.561 |
| *K/S* | 59,064 | 0.377 | 0.922 | 0.034 | 0.258 | 0.699 |
| *Y/S* | 59,064 | 0.020 | 2.838 | -0.002 | 0.042 | 0.128 |
| *RDK* | 59,064 | 0.194 | 3.187 | 0.000 | 0.011 | 0.190 |
| *RDUM* | 59,064 | 0.612 | 0.487 | 0.000 | 1.000 | 1.000 |
| *AK* | 59,064 | 0.261 | 5.260 | 0.000 | 0.000 | 0.157 |
| *ADUM* | 59,064 | 0.441 | 0.496 | 0.000 | 0.000 | 1.000 |
| *I/K* | 59,064 | 0.357 | 2.358 | 0.026 | 0.119 | 0.483 |
| *SIGMA* | 59,064 | 0.191 | 0.486 | 0.076 | 0.139 | 0.283 |
| *SIGDUM* | 59,064 | 1.000 | 0.000 | 1.000 | 1.000 | 1.000 |
| FS explanatory variables | | | | | | |
| *R&D/assets* | 59,064 | 0.013 | 0.026 | 0.000 | 0.003 | 0.038 |
| *log (assets)* | 59,064 | 10.386 | 1.622 | 8.478 | 10.230 | 12.510 |
| *capex/assets* | 59,064 | 0.040 | 0.043 | 0.005 | 0.028 | 0.087 |
| *cash flow* | 59,051 | 0.060 | 2.597 | 0.017 | 0.076 | 0.184 |
| *PPE/assets* | 59,064 | 0.287 | 0.186 | 0.046 | 0.268 | 0.538 |
| *leverage* | 59,064 | 0.507 | 0.218 | 0.215 | 0.511 | 0.786 |
| *financially (un)constrained* | 59,064 | 0.136 | 0.342 | 0.000 | 0.000 | 1.000 |
| *turnover* | 59,064 | 0.005 | 0.017 | 0.000 | 0.002 | 0.009 |
| *idiosyncratic volatility* | 59,064 | 2.621 | 2.121 | 1.193 | 2.171 | 4.349 |
| *industry-adj. return* | 57,406 | 0.057 | 0.556 | -0.369 | -0.009 | 0.477 |
| *market return* | 59,064 | 0.048 | 0.249 | -0.278 | 0.022 | 0.464 |
| *change in CEO* | 59,064 | 0.273 | 0.446 | 0.000 | 0.000 | 1.000 |
| *analyst coverage* | 59,064 | 0.726 | 1.277 | 0.000 | 0.000 | 2.290 |
| Other variables | | | | | | |
| *Years listed* | 59,064 | 17.635 | 11.263 | 3.313 | 16.110 | 34.253 |
| *Amihud* | 59,048 | 47.716 | 94.419 | 3.230 | 17.181 | 119.932 |
| *FHT* | 59,031 | 1.611 | 3.147 | 0.124 | 0.614 | 4.063 |

p10, p50 and p90 are the 10th, 50th and 90th percentile, respectively, of the variables (hereafter the same applies). Because the HHP control variable *SIGMA* is available for all firm-years in our analysis, *SIGDUM* is not included as an explanatory variable in the regressions in the following tables.

Table 1. Continued.

(B) Mean values of Tobin's *q*, grouped by level of managerial ownership

The tables report mean values of Tobin's *q*, grouped by level of managerial ownership (*m*).

(a) All firms

| Managerial ownership (*m*) | Number of firm-years | Mean Tobin's q | S.D. of Tobin's q |
|---|---|---|---|
| 0-0.2% | 11,880 | 1.143 | 0.516 |
| 0.2-5% | 24,669 | 1.037 | 0.533 |
| 5-10% | 5,830 | 1.121 | 0.686 |
| 10-15% | 4,072 | 1.121 | 0.646 |
| 15-20% | 3,012 | 1.208 | 0.730 |
| 20-25% | 2,244 | 1.250 | 0.781 |
| 25-30% | 1,879 | 1.333 | 0.867 |
| 30-35% | 1,500 | 1.400 | 0.894 |
| 35-40% | 1,172 | 1.475 | 1.001 |
| 40-45% | 845 | 1.509 | 1.034 |
| 45-50% | 725 | 1.459 | 1.014 |
| 50-55% | 469 | 1.581 | 1.095 |
| 55-60% | 316 | 1.652 | 1.109 |
| 60-65% | 195 | 1.699 | 1.164 |
| 65-70% | 129 | 1.795 | 1.267 |
| 70-75% | 35 | 2.767 | 1.664 |
| 75-80% | 49 | 1.831 | 1.019 |

(b) 500 largest firms

| Managerial ownership (*m*) | Number of firm-years | Mean Tobin's q | S.D. of Tobin's q |
|---|---|---|---|
| 0-0.2% | 5,529 | 1.148 | 0.425 |
| 0.2-5% | 2,533 | 1.104 | 0.450 |
| 5-10% | 365 | 1.207 | 0.607 |
| 10-15% | 202 | 1.197 | 0.445 |
| 15-20% | 108 | 1.218 | 0.416 |
| 20-25% | 73 | 1.525 | 0.976 |
| 25-30% | 49 | 1.762 | 0.931 |
| 30-35% | 50 | 1.337 | 0.554 |
| 35-40% | 55 | 1.290 | 0.838 |
| 40-45% | 10 | 1.287 | 0.697 |
| 45-50% | 13 | 1.230 | 0.747 |
| 50-55% | 7 | 1.441 | 0.458 |
| 55-60% | 3 | 0.983 | 0.117 |
| 60-65% | 0 | — | — |
| 65-70% | 0 | — | — |
| 70-75% | 0 | — | — |
| 75-80% | 3 | 1.944 | 0.540 |

(c) Young firms

| Managerial ownership (*m*) | Number of firm-years | Mean Tobin's q | S.D. of Tobin's q |
|---|---|---|---|
| 0-0.2% | 1,722 | 1.286 | 0.734 |
| 0.2-5% | 4,639 | 1.258 | 0.788 |
| 5-10% | 1,877 | 1.359 | 0.898 |
| 10-15% | 1,739 | 1.279 | 0.811 |
| 15-20% | 1,591 | 1.346 | 0.851 |
| 20-25% | 1,236 | 1.410 | 0.878 |
| 25-30% | 1,165 | 1.469 | 0.953 |
| 30-35% | 1,089 | 1.500 | 0.942 |
| 35-40% | 941 | 1.538 | 1.027 |
| 40-45% | 669 | 1.576 | 1.099 |
| 45-50% | 580 | 1.560 | 1.072 |
| 50-55% | 406 | 1.639 | 1.137 |
| 55-60% | 297 | 1.693 | 1.125 |
| 60-65% | 176 | 1.763 | 1.192 |
| 65-70% | 123 | 1.833 | 1.280 |
| 70-75% | 33 | 2.853 | 1.677 |
| 75-80% | 42 | 1.833 | 1.074 |

(d) Mature firms

| Managerial ownership (*m*) | Number of firm-years | Mean Tobin's q | S.D. of Tobin's q |
|---|---|---|---|
| 0-0.2% | 10,158 | 1.119 | 0.465 |
| 0.2-5% | 20,030 | 0.986 | 0.439 |
| 5-10% | 3,953 | 1.008 | 0.521 |
| 10-15% | 2,333 | 1.003 | 0.455 |
| 15-20% | 1,421 | 1.053 | 0.522 |
| 20-25% | 1,008 | 1.053 | 0.585 |
| 25-30% | 714 | 1.109 | 0.644 |
| 30-35% | 411 | 1.136 | 0.683 |
| 35-40% | 231 | 1.219 | 0.838 |
| 40-45% | 176 | 1.255 | 0.679 |
| 45-50% | 145 | 1.053 | 0.580 |
| 50-55% | 63 | 1.209 | 0.657 |
| 55-60% | 19 | 1.002 | 0.491 |
| 60-65% | 19 | 1.107 | 0.613 |
| 65-70% | 6 | 1.010 | 0.569 |
| 70-75% | 2 | 1.355 | 0.051 |
| 75-80% | 7 | 1.824 | 0.652 |

Table 1. Continued.

(C) Summary statistics by fiscal year

The tables report the summary statistics by fiscal year. They are comparable to those of FFST (p. 47 Table 1).

(a) All firms

| | Tobin's $q$ | | | | | Managerial ownership ($m$) | | | | | Amihud | | | | | FHT | | | | | Years listed | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | Obs. | Mean | p10 | p50 | p90 | Obs. | Mean | p10 | p50 | p90 | Obs. | Mean | p10 | p50 | p90 | Obs. | Mean | p10 | p50 | p90 | Obs. | Mean | p10 | p50 | p90 |
| 2000 | 3,149 | 1.216 | 0.800 | 1.044 | 1.709 | 3,149 | 0.085 | 0.001 | 0.015 | 0.278 | 3,149 | 85.279 | 12.529 | 53.169 | 186.482 | 3,148 | 3.172 | 0.364 | 1.812 | 7.804 | 3,149 | 13.419 | 2.272 | 12.022 | 24.255 |
| 2001 | 3,267 | 1.181 | 0.768 | 1.018 | 1.692 | 3,267 | 0.089 | 0.001 | 0.018 | 0.289 | 3,267 | 81.887 | 10.545 | 49.545 | 176.994 | 3,266 | 2.814 | 0.306 | 1.644 | 6.587 | 3,267 | 13.584 | 1.780 | 12.277 | 25.254 |
| 2002 | 3,312 | 0.952 | 0.585 | 0.879 | 1.320 | 3,312 | 0.094 | 0.001 | 0.020 | 0.298 | 3,312 | 79.040 | 9.389 | 45.834 | 172.989 | 3,312 | 2.602 | 0.244 | 1.550 | 6.140 | 3,312 | 13.914 | 2.234 | 12.431 | 26.253 |
| 2003 | 3,278 | 1.138 | 0.682 | 0.983 | 1.693 | 3,278 | 0.092 | 0.001 | 0.021 | 0.289 | 3,278 | 54.416 | 5.224 | 27.341 | 123.967 | 3,278 | 1.937 | 0.218 | 1.150 | 4.394 | 3,278 | 14.372 | 2.450 | 13.086 | 27.255 |
| 2004 | 3,341 | 1.255 | 0.760 | 1.043 | 1.903 | 3,341 | 0.091 | 0.001 | 0.022 | 0.286 | 3,341 | 33.547 | 3.723 | 14.836 | 76.701 | 3,341 | 1.360 | 0.178 | 0.795 | 2.875 | 3,341 | 14.760 | 2.533 | 13.426 | 28.255 |
| 2005 | 3,376 | 1.438 | 0.858 | 1.181 | 2.305 | 3,376 | 0.091 | 0.001 | 0.022 | 0.291 | 3,376 | 22.024 | 2.595 | 8.394 | 51.551 | 3,376 | 1.063 | 0.167 | 0.574 | 2.304 | 3,376 | 15.160 | 2.387 | 13.624 | 29.254 |
| 2006 | 3,482 | 1.296 | 0.802 | 1.091 | 1.982 | 3,482 | 0.098 | 0.001 | 0.025 | 0.315 | 3,482 | 29.701 | 2.775 | 10.881 | 68.081 | 3,482 | 1.057 | 0.135 | 0.513 | 2.556 | 3,482 | 15.244 | 2.111 | 13.290 | 30.253 |
| 2007 | 3,522 | 1.058 | 0.666 | 0.938 | 1.540 | 3,522 | 0.101 | 0.001 | 0.027 | 0.322 | 3,522 | 44.366 | 3.207 | 16.791 | 104.305 | 3,522 | 1.375 | 0.136 | 0.576 | 3.574 | 3,522 | 15.686 | 2.204 | 13.546 | 31.255 |
| 2008 | 3,469 | 0.892 | 0.543 | 0.823 | 1.220 | 3,469 | 0.098 | 0.001 | 0.021 | 0.314 | 3,469 | 83.309 | 5.243 | 34.173 | 199.860 | 3,469 | 2.354 | 0.173 | 0.807 | 6.674 | 3,469 | 16.541 | 3.042 | 14.491 | 32.255 |
| 2009 | 3,324 | 0.962 | 0.596 | 0.876 | 1.344 | 3,324 | 0.095 | 0.001 | 0.021 | 0.306 | 3,324 | 73.380 | 3.973 | 28.862 | 184.738 | 3,324 | 2.118 | 0.139 | 0.714 | 5.791 | 3,324 | 17.570 | 3.943 | 15.506 | 33.254 |
| 2010 | 3,238 | 0.938 | 0.593 | 0.859 | 1.303 | 3,238 | 0.089 | 0.001 | 0.020 | 0.292 | 3,237 | 62.607 | 3.517 | 24.670 | 158.914 | 3,237 | 2.103 | 0.125 | 0.687 | 5.618 | 3,238 | 18.551 | 4.778 | 16.542 | 34.253 |
| 2011 | 3,179 | 0.934 | 0.601 | 0.862 | 1.278 | 3,179 | 0.084 | 0.001 | 0.020 | 0.280 | 3,179 | 58.005 | 3.504 | 23.445 | 137.612 | 3,179 | 1.803 | 0.117 | 0.589 | 4.809 | 3,179 | 19.378 | 5.361 | 17.489 | 35.255 |
| 2012 | 3,155 | 0.995 | 0.608 | 0.887 | 1.416 | 3,155 | 0.082 | 0.001 | 0.020 | 0.278 | 3,155 | 46.881 | 3.250 | 19.445 | 116.397 | 3,154 | 1.466 | 0.110 | 0.528 | 3.660 | 3,155 | 20.213 | 6.209 | 18.431 | 36.255 |
| 2013 | 3,106 | 1.101 | 0.648 | 0.940 | 1.696 | 3,106 | 0.075 | 0.001 | 0.018 | 0.247 | 3,106 | 26.050 | 2.771 | 10.052 | 65.333 | 3,104 | 0.952 | 0.091 | 0.405 | 2.321 | 3,106 | 21.052 | 7.028 | 19.437 | 37.254 |
| 2014 | 3,151 | 1.235 | 0.720 | 1.014 | 1.972 | 3,151 | 0.077 | 0.001 | 0.019 | 0.247 | 3,149 | 20.509 | 2.301 | 7.968 | 49.361 | 3,147 | 0.773 | 0.081 | 0.334 | 1.861 | 3,151 | 21.560 | 7.176 | 19.970 | 38.253 |
| 2015 | 3,233 | 1.234 | 0.672 | 0.983 | 2.114 | 3,233 | 0.078 | 0.001 | 0.019 | 0.258 | 3,229 | 20.236 | 2.530 | 7.871 | 44.733 | 3,226 | 0.686 | 0.069 | 0.307 | 1.611 | 3,233 | 21.897 | 5.999 | 20.531 | 39.255 |
| 2016 | 3,246 | 1.295 | 0.703 | 1.026 | 2.228 | 3,246 | 0.081 | 0.001 | 0.018 | 0.265 | 3,243 | 22.035 | 2.520 | 8.629 | 51.333 | 3,240 | 0.777 | 0.075 | 0.311 | 1.880 | 3,246 | 22.532 | 5.196 | 21.429 | 40.255 |
| 2017 | 3,236 | 1.440 | 0.764 | 1.107 | 2.570 | 3,236 | 0.081 | 0.001 | 0.019 | 0.264 | 3,230 | 13.948 | 1.848 | 5.345 | 29.311 | 3,226 | 0.555 | 0.067 | 0.230 | 1.128 | 3,236 | 23.013 | 4.578 | 22.160 | 41.254 |
| Full sample | 59,064 | 1.142 | 0.669 | 0.967 | 1.748 | 59,064 | 0.088 | 0.001 | 0.020 | 0.286 | 59,048 | 47.716 | 3.230 | 17.181 | 119.932 | 59,031 | 1.611 | 0.124 | 0.614 | 4.063 | 59,064 | 17.635 | 3.313 | 16.110 | 34.253 |

(b) 500 largest firms

| | Tobin's $q$ | | | | | Managerial ownership ($m$) | | | | | Amihud | | | | | FHT | | | | | Years listed | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | Obs. | Mean | p10 | p50 | p90 | Obs. | Mean | p10 | p50 | p90 | Obs. | Mean | p10 | p50 | p90 | Obs. | Mean | p10 | p50 | p90 | Obs. | Mean | p10 | p50 | p90 |
| 2000 | 500 | 1.250 | 0.891 | 1.078 | 1.819 | 500 | 0.019 | 0.000 | 0.001 | 0.051 | 500 | 35.705 | 8.242 | 16.903 | 75.553 | 500 | 0.782 | 0.187 | 0.438 | 1.843 | 500 | 18.490 | 5.476 | 24.255 | 24.255 |
| 2001 | 500 | 1.196 | 0.880 | 1.051 | 1.686 | 500 | 0.019 | 0.000 | 0.001 | 0.051 | 500 | 32.332 | 6.967 | 13.862 | 67.307 | 500 | 0.678 | 0.154 | 0.367 | 1.425 | 500 | 19.090 | 5.521 | 25.169 | 25.254 |
| 2002 | 500 | 1.014 | 0.755 | 0.945 | 1.286 | 500 | 0.020 | 0.000 | 0.001 | 0.052 | 500 | 28.545 | 5.732 | 11.820 | 52.625 | 500 | 0.659 | 0.120 | 0.312 | 1.590 | 500 | 19.550 | 5.457 | 26.007 | 26.253 |
| 2003 | 500 | 1.168 | 0.855 | 1.058 | 1.550 | 500 | 0.021 | 0.000 | 0.001 | 0.058 | 500 | 19.929 | 3.833 | 7.104 | 30.391 | 500 | 0.466 | 0.115 | 0.273 | 1.053 | 500 | 19.932 | 5.591 | 25.202 | 27.255 |
| 2004 | 500 | 1.177 | 0.907 | 1.090 | 1.546 | 500 | 0.022 | 0.000 | 0.001 | 0.065 | 500 | 12.201 | 2.647 | 5.146 | 18.130 | 500 | 0.358 | 0.097 | 0.250 | 0.689 | 500 | 20.315 | 5.725 | 24.494 | 28.255 |
| 2005 | 500 | 1.385 | 0.967 | 1.242 | 1.929 | 500 | 0.024 | 0.000 | 0.001 | 0.063 | 500 | 8.703 | 2.134 | 3.898 | 9.449 | 500 | 0.303 | 0.097 | 0.227 | 0.527 | 500 | 21.130 | 6.315 | 25.661 | 29.254 |
| 2006 | 500 | 1.330 | 0.946 | 1.217 | 1.890 | 500 | 0.024 | 0.000 | 0.001 | 0.061 | 500 | 8.454 | 2.012 | 3.669 | 9.542 | 500 | 0.254 | 0.081 | 0.201 | 0.441 | 500 | 21.586 | 6.476 | 25.381 | 30.253 |
| 2007 | 500 | 1.104 | 0.804 | 1.012 | 1.493 | 500 | 0.023 | 0.000 | 0.001 | 0.060 | 500 | 10.416 | 2.256 | 3.749 | 11.718 | 500 | 0.267 | 0.074 | 0.214 | 0.472 | 500 | 22.357 | 6.528 | 26.319 | 31.255 |
| 2008 | 500 | 0.927 | 0.688 | 0.877 | 1.172 | 500 | 0.024 | 0.000 | 0.001 | 0.067 | 500 | 17.572 | 3.320 | 6.226 | 21.884 | 500 | 0.366 | 0.081 | 0.263 | 0.643 | 500 | 23.310 | 7.313 | 27.873 | 32.255 |
| 2009 | 500 | 1.026 | 0.794 | 0.953 | 1.329 | 500 | 0.024 | 0.000 | 0.001 | 0.069 | 500 | 15.361 | 2.430 | 4.597 | 17.534 | 500 | 0.335 | 0.078 | 0.213 | 0.640 | 500 | 23.733 | 7.450 | 27.496 | 33.254 |
| 2010 | 500 | 0.977 | 0.735 | 0.915 | 1.255 | 500 | 0.024 | 0.000 | 0.001 | 0.066 | 500 | 10.897 | 2.072 | 4.128 | 13.372 | 500 | 0.344 | 0.062 | 0.191 | 0.755 | 500 | 24.447 | 7.502 | 28.214 | 34.253 |
| 2011 | 500 | 0.967 | 0.741 | 0.917 | 1.224 | 500 | 0.021 | 0.000 | 0.001 | 0.049 | 500 | 11.620 | 2.160 | 4.294 | 17.983 | 500 | 0.303 | 0.055 | 0.184 | 0.624 | 500 | 25.483 | 8.501 | 29.455 | 35.255 |
| 2012 | 500 | 1.022 | 0.757 | 0.943 | 1.357 | 500 | 0.022 | 0.000 | 0.001 | 0.055 | 500 | 13.158 | 2.109 | 4.125 | 17.681 | 500 | 0.293 | 0.061 | 0.166 | 0.660 | 500 | 25.869 | 8.497 | 29.133 | 36.255 |
| 2013 | 500 | 1.097 | 0.784 | 0.997 | 1.482 | 500 | 0.018 | 0.000 | 0.001 | 0.040 | 500 | 8.656 | 2.037 | 4.327 | 12.147 | 500 | 0.234 | 0.047 | 0.153 | 0.468 | 500 | 26.925 | 9.448 | 30.301 | 37.254 |
| 2014 | 500 | 1.227 | 0.847 | 1.066 | 1.679 | 500 | 0.017 | 0.000 | 0.001 | 0.033 | 500 | 7.115 | 1.723 | 3.361 | 9.617 | 500 | 0.189 | 0.035 | 0.136 | 0.402 | 500 | 27.711 | 10.538 | 30.787 | 38.253 |
| 2015 | 500 | 1.211 | 0.812 | 1.022 | 1.823 | 500 | 0.019 | 0.000 | 0.001 | 0.035 | 500 | 8.565 | 1.898 | 3.948 | 10.792 | 500 | 0.185 | 0.023 | 0.117 | 0.368 | 500 | 28.342 | 10.491 | 31.578 | 39.255 |
| 2016 | 500 | 1.253 | 0.858 | 1.082 | 1.886 | 500 | 0.019 | 0.000 | 0.001 | 0.036 | 500 | 7.865 | 1.925 | 3.629 | 9.919 | 500 | 0.193 | 0.029 | 0.130 | 0.368 | 500 | 28.956 | 10.541 | 32.287 | 40.255 |
| 2017 | 500 | 1.346 | 0.864 | 1.115 | 2.178 | 500 | 0.018 | 0.000 | 0.001 | 0.038 | 500 | 6.762 | 1.686 | 2.983 | 7.412 | 500 | 0.149 | 0.029 | 0.121 | 0.265 | 500 | 29.977 | 11.996 | 33.073 | 41.254 |
| Full sample | 9,000 | 1.149 | 0.806 | 1.024 | 1.602 | 9,000 | 0.021 | 0.000 | 0.001 | 0.053 | 9,000 | 14.659 | 2.256 | 4.942 | 23.045 | 9,000 | 0.353 | 0.061 | 0.209 | 0.672 | 9,000 | 23.734 | 7.491 | 25.254 | 37.254 |

Table 1(C). Continued.

(c) Young firms

| | Tobin's $q$ | | | | | Managerial ownership ($m$) | | | | | Amihud | | | | | FHT | | | | | Years listed | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | Obs. | Mean | p10 | p50 | p90 | Obs. | Mean | p10 | p50 | p90 | Obs. | Mean | p10 | p50 | p90 | Obs. | Mean | p10 | p50 | p90 | Obs. | Mean | p10 | p50 | p90 |
| 2000 | 1,313 | 1.346 | 0.809 | 1.097 | 2.135 | 1,313 | 0.154 | 0.002 | 0.115 | 0.379 | 1,313 | 87.443 | 16.682 | 55.527 | 170.152 | 1,313 | 3.573 | 0.543 | 2.371 | 7.976 | 1,313 | 4.711 | 0.780 | 4.600 | 9.095 |
| 2001 | 1,348 | 1.350 | 0.796 | 1.100 | 2.267 | 1,348 | 0.159 | 0.003 | 0.114 | 0.404 | 1,348 | 80.716 | 12.709 | 51.821 | 171.738 | 1,348 | 3.035 | 0.434 | 2.127 | 6.724 | 1,348 | 4.498 | 0.591 | 4.527 | 8.287 |
| 2002 | 1,408 | 1.059 | 0.619 | 0.916 | 1.629 | 1,408 | 0.167 | 0.002 | 0.124 | 0.416 | 1,408 | 87.315 | 13.214 | 51.340 | 184.780 | 1,408 | 2.764 | 0.347 | 1.867 | 6.140 | 1,408 | 4.808 | 1.062 | 4.747 | 8.597 |
| 2003 | 1,363 | 1.304 | 0.695 | 1.034 | 2.224 | 1,363 | 0.161 | 0.002 | 0.118 | 0.402 | 1,363 | 58.740 | 7.165 | 32.449 | 122.170 | 1,363 | 2.040 | 0.280 | 1.418 | 4.378 | 1,363 | 5.051 | 1.235 | 4.931 | 8.953 |
| 2004 | 1,354 | 1.521 | 0.796 | 1.155 | 2.803 | 1,354 | 0.159 | 0.002 | 0.113 | 0.396 | 1,354 | 33.789 | 4.265 | 15.993 | 72.530 | 1,354 | 1.538 | 0.229 | 0.964 | 2.986 | 1,354 | 5.038 | 0.936 | 4.694 | 9.284 |
| 2005 | 1,271 | 1.774 | 0.916 | 1.405 | 3.188 | 1,271 | 0.165 | 0.002 | 0.118 | 0.410 | 1,271 | 19.244 | 2.886 | 8.583 | 40.750 | 1,271 | 1.133 | 0.214 | 0.679 | 2.292 | 1,271 | 4.817 | 1.021 | 4.684 | 8.895 |
| 2006 | 1,328 | 1.579 | 0.875 | 1.280 | 2.787 | 1,328 | 0.180 | 0.002 | 0.129 | 0.450 | 1,328 | 23.151 | 2.823 | 10.419 | 51.624 | 1,328 | 0.991 | 0.183 | 0.613 | 2.077 | 1,328 | 4.605 | 0.813 | 4.578 | 8.747 |
| 2007 | 1,308 | 1.227 | 0.726 | 1.029 | 1.968 | 1,308 | 0.189 | 0.002 | 0.137 | 0.468 | 1,308 | 35.453 | 3.712 | 17.271 | 87.986 | 1,308 | 1.191 | 0.172 | 0.666 | 2.587 | 1,308 | 4.629 | 1.038 | 4.322 | 8.490 |
| 2008 | 1,228 | 1.022 | 0.585 | 0.877 | 1.535 | 1,228 | 0.189 | 0.002 | 0.140 | 0.469 | 1,228 | 75.621 | 7.108 | 38.787 | 177.388 | 1,228 | 1.867 | 0.211 | 0.846 | 4.786 | 1,228 | 5.070 | 1.766 | 4.782 | 8.780 |
| 2009 | 1,066 | 1.119 | 0.655 | 0.932 | 1.695 | 1,066 | 0.190 | 0.002 | 0.140 | 0.464 | 1,066 | 75.398 | 5.322 | 41.939 | 189.824 | 1,066 | 1.776 | 0.165 | 0.779 | 4.487 | 1,066 | 5.530 | 2.237 | 5.344 | 9.180 |
| 2010 | 924 | 1.110 | 0.661 | 0.942 | 1.709 | 924 | 0.186 | 0.002 | 0.137 | 0.455 | 924 | 66.795 | 4.121 | 31.672 | 175.940 | 924 | 1.830 | 0.142 | 0.656 | 4.341 | 924 | 5.821 | 2.779 | 5.789 | 9.292 |
| 2011 | 800 | 1.110 | 0.658 | 0.940 | 1.717 | 800 | 0.183 | 0.002 | 0.120 | 0.444 | 800 | 57.869 | 4.263 | 25.762 | 142.619 | 800 | 1.586 | 0.120 | 0.598 | 3.636 | 800 | 5.895 | 2.524 | 6.052 | 9.106 |
| 2012 | 718 | 1.235 | 0.651 | 0.992 | 2.004 | 718 | 0.189 | 0.002 | 0.123 | 0.457 | 718 | 41.981 | 3.248 | 17.396 | 109.947 | 717 | 1.165 | 0.110 | 0.482 | 2.660 | 718 | 6.035 | 1.492 | 6.428 | 9.043 |
| 2013 | 663 | 1.432 | 0.704 | 1.106 | 2.513 | 663 | 0.173 | 0.002 | 0.110 | 0.439 | 663 | 19.824 | 2.583 | 8.651 | 48.272 | 661 | 0.757 | 0.091 | 0.376 | 1.491 | 663 | 6.232 | 1.287 | 7.099 | 9.311 |
| 2014 | 624 | 1.702 | 0.845 | 1.294 | 3.340 | 624 | 0.184 | 0.003 | 0.123 | 0.453 | 622 | 14.670 | 2.082 | 6.363 | 32.009 | 620 | 0.593 | 0.072 | 0.292 | 1.251 | 624 | 5.886 | 0.983 | 7.157 | 9.270 |
| 2015 | 607 | 1.802 | 0.833 | 1.395 | 3.301 | 607 | 0.194 | 0.003 | 0.132 | 0.465 | 603 | 12.675 | 1.972 | 5.551 | 27.453 | 600 | 0.447 | 0.046 | 0.243 | 0.857 | 607 | 5.219 | 0.526 | 5.051 | 9.369 |
| 2016 | 533 | 1.962 | 0.884 | 1.471 | 3.884 | 533 | 0.211 | 0.003 | 0.160 | 0.496 | 530 | 12.375 | 1.720 | 5.762 | 27.867 | 527 | 0.688 | 0.053 | 0.230 | 0.963 | 533 | 4.575 | 0.849 | 3.997 | 9.380 |
| 2017 | 510 | 2.217 | 0.970 | 1.754 | 4.513 | 510 | 0.216 | 0.003 | 0.159 | 0.522 | 504 | 7.793 | 1.272 | 3.750 | 12.959 | 500 | 0.675 | 0.056 | 0.191 | 0.684 | 510 | 4.003 | 0.758 | 3.265 | 8.805 |
| Full sample | 18,366 | 1.383 | 0.721 | 1.079 | 2.442 | 18,366 | 0.177 | 0.002 | 0.126 | 0.438 | 18,351 | 50.446 | 3.564 | 21.908 | 123.747 | 18,336 | 1.727 | 0.159 | 0.799 | 4.116 | 18,366 | 5.065 | 1.054 | 5.158 | 9.051 |

(d) Mature firms

| | Tobin's $q$ | | | | | Managerial ownership ($m$) | | | | | Amihud | | | | | FHT | | | | | Years listed | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | Obs. | Mean | p10 | p50 | p90 | Obs. | Mean | p10 | p50 | p90 | Obs. | Mean | p10 | p50 | p90 | Obs. | Mean | p10 | p50 | p90 | Obs. | Mean | p10 | p50 | p90 |
| 2000 | 1,836 | 1.123 | 0.794 | 1.020 | 1.461 | 1,836 | 0.035 | 0.001 | 0.005 | 0.109 | 1,836 | 83.731 | 10.912 | 49.608 | 194.997 | 1,835 | 2.885 | 0.301 | 1.329 | 7.700 | 1,836 | 19.646 | 11.329 | 24.008 | 24.255 |
| 2001 | 1,919 | 1.063 | 0.753 | 0.985 | 1.372 | 1,919 | 0.039 | 0.001 | 0.006 | 0.131 | 1,919 | 82.710 | 9.721 | 47.894 | 181.950 | 1,918 | 2.658 | 0.259 | 1.209 | 6.528 | 1,919 | 19.966 | 11.409 | 24.159 | 25.254 |
| 2002 | 1,904 | 0.873 | 0.573 | 0.852 | 1.138 | 1,904 | 0.039 | 0.001 | 0.006 | 0.129 | 1,904 | 72.920 | 8.008 | 41.498 | 168.690 | 1,904 | 2.483 | 0.213 | 1.171 | 6.157 | 1,904 | 20.648 | 12.164 | 23.995 | 26.253 |
| 2003 | 1,915 | 1.020 | 0.675 | 0.954 | 1.380 | 1,915 | 0.042 | 0.001 | 0.007 | 0.137 | 1,915 | 51.339 | 4.675 | 21.827 | 125.850 | 1,915 | 1.864 | 0.188 | 0.893 | 4.394 | 1,915 | 21.006 | 12.378 | 22.831 | 27.255 |
| 2004 | 1,987 | 1.073 | 0.744 | 1.000 | 1.434 | 1,987 | 0.045 | 0.001 | 0.007 | 0.151 | 1,987 | 33.382 | 3.482 | 13.745 | 81.773 | 1,987 | 1.239 | 0.162 | 0.669 | 2.802 | 1,987 | 21.385 | 11.918 | 21.999 | 28.255 |
| 2005 | 2,105 | 1.235 | 0.836 | 1.109 | 1.759 | 2,105 | 0.047 | 0.001 | 0.007 | 0.152 | 2,105 | 23.702 | 2.500 | 8.248 | 58.279 | 2,105 | 1.020 | 0.150 | 0.499 | 2.322 | 2,105 | 21.405 | 11.368 | 20.211 | 29.254 |
| 2006 | 2,154 | 1.122 | 0.770 | 1.021 | 1.578 | 2,154 | 0.048 | 0.001 | 0.008 | 0.157 | 2,154 | 33.740 | 2.747 | 11.503 | 77.877 | 2,154 | 1.098 | 0.123 | 0.442 | 2.937 | 2,154 | 21.804 | 11.548 | 20.578 | 30.253 |
| 2007 | 2,214 | 0.957 | 0.640 | 0.897 | 1.333 | 2,214 | 0.049 | 0.001 | 0.009 | 0.162 | 2,214 | 49.632 | 3.068 | 16.287 | 120.377 | 2,214 | 1.483 | 0.123 | 0.520 | 4.130 | 2,214 | 22.218 | 11.814 | 21.402 | 31.255 |
| 2008 | 2,241 | 0.820 | 0.526 | 0.799 | 1.078 | 2,241 | 0.047 | 0.001 | 0.008 | 0.157 | 2,241 | 87.522 | 4.733 | 31.352 | 215.095 | 2,241 | 2.621 | 0.155 | 0.768 | 7.503 | 2,241 | 22.827 | 12.342 | 22.138 | 32.255 |
| 2009 | 2,258 | 0.888 | 0.576 | 0.851 | 1.191 | 2,258 | 0.049 | 0.001 | 0.009 | 0.159 | 2,258 | 72.428 | 3.674 | 23.319 | 180.961 | 2,258 | 2.279 | 0.131 | 0.688 | 6.488 | 2,258 | 23.254 | 12.438 | 22.286 | 33.254 |
| 2010 | 2,314 | 0.869 | 0.575 | 0.832 | 1.159 | 2,314 | 0.051 | 0.001 | 0.009 | 0.166 | 2,313 | 60.933 | 3.309 | 21.661 | 153.135 | 2,313 | 2.212 | 0.118 | 0.724 | 6.024 | 2,314 | 23.633 | 12.151 | 22.376 | 34.253 |
| 2011 | 2,379 | 0.875 | 0.588 | 0.839 | 1.179 | 2,379 | 0.051 | 0.001 | 0.011 | 0.166 | 2,379 | 58.051 | 3.361 | 22.469 | 136.853 | 2,379 | 1.876 | 0.117 | 0.587 | 4.988 | 2,379 | 23.911 | 11.978 | 22.428 | 35.255 |
| 2012 | 2,437 | 0.925 | 0.600 | 0.863 | 1.281 | 2,437 | 0.051 | 0.001 | 0.011 | 0.163 | 2,437 | 48.324 | 3.250 | 19.886 | 119.194 | 2,437 | 1.555 | 0.109 | 0.539 | 3.938 | 2,437 | 24.390 | 12.309 | 23.264 | 36.255 |
| 2013 | 2,443 | 1.011 | 0.644 | 0.915 | 1.445 | 2,443 | 0.048 | 0.001 | 0.011 | 0.151 | 2,443 | 27.740 | 2.854 | 10.512 | 69.674 | 2,443 | 1.005 | 0.092 | 0.423 | 2.502 | 2,443 | 25.074 | 12.548 | 23.929 | 37.254 |
| 2014 | 2,527 | 1.120 | 0.700 | 0.974 | 1.650 | 2,527 | 0.050 | 0.001 | 0.012 | 0.161 | 2,527 | 21.946 | 2.387 | 8.549 | 53.027 | 2,527 | 0.817 | 0.083 | 0.356 | 2.017 | 2,527 | 25.430 | 12.914 | 24.323 | 38.253 |
| 2015 | 2,626 | 1.103 | 0.652 | 0.944 | 1.685 | 2,626 | 0.052 | 0.001 | 0.013 | 0.168 | 2,626 | 21.972 | 2.750 | 8.632 | 50.844 | 2,626 | 0.741 | 0.071 | 0.328 | 1.712 | 2,626 | 25.752 | 12.457 | 24.498 | 39.255 |
| 2016 | 2,713 | 1.164 | 0.689 | 0.981 | 1.829 | 2,713 | 0.055 | 0.001 | 0.013 | 0.180 | 2,713 | 23.922 | 2.771 | 9.502 | 57.495 | 2,713 | 0.795 | 0.079 | 0.335 | 2.000 | 2,713 | 26.059 | 12.323 | 25.076 | 40.255 |
| 2017 | 2,726 | 1.294 | 0.750 | 1.059 | 2.141 | 2,726 | 0.055 | 0.001 | 0.013 | 0.176 | 2,726 | 15.085 | 2.003 | 5.800 | 32.134 | 2,726 | 0.533 | 0.070 | 0.239 | 1.214 | 2,726 | 26.570 | 12.550 | 24.973 | 41.254 |
| Full sample | 40,698 | 1.033 | 0.651 | 0.933 | 1.473 | 40,698 | 0.048 | 0.001 | 0.009 | 0.156 | 40,697 | 46.486 | 3.124 | 15.334 | 117.917 | 40,695 | 1.558 | 0.114 | 0.535 | 4.039 | 40,698 | 23.308 | 12.104 | 23.118 | 36.255 |

Table 2. Determinants of managerial ownership

The table follows HHP (p. 368 Table 4(A)). The specifications reported in the table all model the fraction of managerial ownership ($m$), by regressing the transformed dependent variable $LN(m/(1-m))$ on the explanatory variables indicated below. Intercept terms and year dummies are included for all the regressions but not reported.

The following are also applied to all tables in the paper. Variable descriptions are given in Appendix A. The sample period is from 2000 to 2017. Coefficients marked with *, ** and *** are statistically significant at the 10%, 5% and 1% levels, respectively. Standard errors robust to both clustering at firm-level and heteroscedasticity are reported in parentheses (except for adjusted FM regressions). For adjusted FM regressions, adjusted Fama-MacBeth standard errors are reported (for the adjustment, see Section 3-1-3). Year fixed effects and/or fixed effects at the industry or firm level are included where indicated, but not reported. We adopt TSE 33 industry classifications for controlling industry fixed effects.

| | All firms | | | 500 largest firms | Non-500 largest |
|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) |
| *LN(S)* | 0.32 ** | 0.30 ** | 0.20 | -2.19 * | 0.42 |
| | (0.14) | (0.14) | (0.22) | (1.16) | (0.29) |
| *(LN(S))^2* | -0.05 *** | -0.05 *** | -0.01 | 0.07 * | -0.02 |
| | (0.01) | (0.01) | (0.01) | (0.04) | (0.01) |
| *K/S* | -0.59 *** | -0.51 *** | -0.05 | 0.11 | -0.04 |
| | (0.06) | (0.06) | (0.04) | (0.40) | (0.04) |
| *(K/S)^2* | 0.00 *** | 0.00 *** | 0.00 | -0.04 | 0.00 |
| | (0.00) | (0.00) | (0.00) | (0.08) | (0.00) |
| *SIGMA* | 0.14 *** | 0.13 *** | 0.02 ** | 0.04 | 0.02 * |
| | (0.02) | (0.02) | (0.01) | (0.15) | (0.01) |
| *Y/S* | -0.02 *** | -0.02 *** | -0.00 | 1.54 ** | -0.00 |
| | (0.00) | (0.00) | (0.00) | (0.66) | (0.00) |
| *RDK* | -0.01 ** | -0.01 ** | -0.00 | -0.91 | -0.00 |
| | (0.00) | (0.00) | (0.00) | (0.56) | (0.00) |
| *RDUM* | -0.79 *** | -0.10 | 0.06 | 0.14 | 0.06 |
| | (0.05) | (0.07) | (0.05) | (0.10) | (0.06) |
| *A/K* | 0.01 *** | 0.01 *** | 0.00 | 0.13 | 0.00 |
| | (0.00) | (0.00) | (0.00) | (0.21) | (0.00) |
| *ADUM* | 0.36 *** | 0.23 *** | -0.08 *** | -0.03 | -0.11 *** |
| | (0.05) | (0.05) | (0.03) | (0.07) | (0.03) |
| *I/K* | -0.01 | -0.01 ** | -0.01 | -0.12 | -0.01 |
| | (0.01) | (0.01) | (0.01) | (0.23) | (0.01) |
| #Obs. | 59,011 | 59,011 | 59,011 | 9,000 | 50,011 |
| Year FE | Yes | Yes | Yes | Yes | Yes |
| Industry FE | No | Yes | No | No | No |
| Firm FE | No | No | Yes | Yes | Yes |

Table 3. Effects of past stock liquidity on managerial ownership

The table reports estimates of adjusted FM and OLS regressions of managerial ownership (*m*) on measures of past stock liquidity. Managerial ownership (*m*) is regressed against a measure of past liquidity (Amihud or FHT measure) and HHP control variables. *High liquidity years (Amihud)* and *high liquidity years (FHT)* or *low liquidity years (Amihud)* and *low liquidity years (FHT)* are the fractions of years during the sample period that a firm spent in the high or low liquidity bracket, where high or low liquidity refers to the top or bottom quartile of the annual liquidity distribution (as in FFST p. 20). The table is comparable to that of FFST (p. 53 Table 6). For other points, see Table 2.

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| ***High liquidity years (Amihud)*** | **0.009** | **0.010 *** | | | | | | |
| | **(0.01)** | **(0.00)** | | | | | | |
| ***Low liquidity years (Amihud)*** | | | **-0.013 ***** | **-0.013 **** | | | | |
| | | | **(0.00)** | **(0.01)** | | | | |
| ***High liquidity years (FHT)*** | | | | | **0.030 ***** | **0.031 ***** | | |
| | | | | | **(0.01)** | **(0.01)** | | |
| ***Low liquidity years (FHT)*** | | | | | | | **-0.035 ***** | **-0.034 ***** |
| | | | | | | | **(0.01)** | **(0.01)** |
| *LN(S)* | -0.095 *** | -0.081 *** | -0.098 *** | -0.084 *** | -0.096 *** | -0.082 *** | -0.107 *** | -0.092 *** |
| | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) |
| *(LN(S))^2* | 0.003 *** | 0.003 *** | 0.003 *** | 0.003 *** | 0.003 *** | 0.002 *** | 0.004 *** | 0.003 *** |
| | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| *K/S* | -0.036 *** | -0.027 *** | -0.036 *** | -0.026 *** | -0.037 *** | -0.027 *** | -0.037 *** | -0.027 *** |
| | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| *(K/S)^2* | 0.001 *** | 0.000 *** | 0.001 *** | 0.000 *** | 0.001 *** | 0.000 *** | 0.001 *** | 0.000 *** |
| | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| *SIGMA* | 0.019 *** | 0.018 *** | 0.019 *** | 0.018 *** | 0.020 *** | 0.017 *** | 0.020 *** | 0.017 *** |
| | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| *Y/S* | 0.045 *** | 0.000 | 0.045 *** | 0.000 | 0.043 *** | 0.000 | 0.045 *** | 0.000 |
| | (0.01) | (0.00) | (0.01) | (0.00) | (0.01) | (0.00) | (0.01) | (0.00) |
| *RDK* | 0.002 | -0.001 ** | 0.002 | -0.001 ** | 0.002 | -0.001 ** | 0.001 | -0.001 ** |
| | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| *RDUM* | -0.015 *** | -0.015 *** | -0.015 *** | -0.016 *** | -0.016 *** | -0.016 *** | -0.017 *** | -0.018 *** |
| | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| *A/K* | 0.005 *** | 0.001 *** | 0.004 *** | 0.001 *** | 0.004 *** | 0.001 *** | 0.004 *** | 0.001 *** |
| | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| *ADUM* | 0.011 *** | 0.012 *** | 0.011 *** | 0.013 *** | 0.010 *** | 0.012 *** | 0.011 *** | 0.013 *** |
| | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| *I/K* | -0.000 | -0.000 | -0.000 | -0.000 | -0.001 | -0.000 | -0.001 | -0.001 |
| | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| #Obs. | 59,048 | 59,048 | 59,048 | 59,048 | 59,031 | 59,031 | 59,031 | 59,031 |
| Estimation approach | FM | OLS | FM | OLS | FM | OLS | FM | OLS |
| Year FE | No | Yes | No | Yes | No | Yes | No | Yes |
| Industry FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| (Avg.) R-squared | 0.26 | 0.24 | 0.26 | 0.24 | 0.26 | 0.24 | 0.26 | 0.25 |

Table 4. Large changes in managerial ownership and changes in explanatory variables

(A) Fraction of firm-years with a large change in ownership

The table shows means of three dummy variables that are equal to one if a firm experiences no change, a large drop or a large increase, respectively, in managerial ownership (*m*), and otherwise equal to zero. As in FS (p. 346), a large drop (increase) is defined as a change in *m* larger than 2.5% in absolute value. The dummy variable *No change* takes one if a firm has a small change in ownership at 2.5% or less in absolute value, and otherwise zero.

| | All firms | | Young firms | | Mature firms | | Difference |
|---|---|---|---|---|---|---|---|
| | Obs. | Mean | Obs. | Mean | Obs. | Mean | Mean |
| *No change* | 53,401 | 0.907 | 14,983 | 0.806 | 38,418 | 0.946 | -0.140 *** |
| *Large drop* | 53,401 | 0.074 | 14,983 | 0.155 | 38,418 | 0.042 | 0.113 *** |
| *Large increase* | 53,401 | 0.020 | 14,983 | 0.040 | 38,418 | 0.012 | 0.028 *** |

Significant differences for the means between young and mature firms are indicated at the 1% level by ***.

Table 4. Continued.

(B) Decomposition of large ownership changes and changes in explanatory variables

In the spirit of FS (p. 351 Table 3, p. 352 Table 4), the table reports marginal effects of probit regressions of both a) large decreases (columns (1), (7) and (9)) and large increases (columns (4), (8) and (10)) in managerial ownership (*m*) and b) the decomposition of the large decreases (columns (2) and (3)) and increases (columns (5) and (6)) on changes in explanatory variables.

The dependent variable in columns (1), (4) and (7) to (10) is equal to one if *m* decreases (increases) by more than 2.5% in absolute value, and zero otherwise. The decomposition in columns (2) to (3) and columns (5) to (6) is done as in Helwege, Pirinsky and Stulz (2007, p. 1009 Eq. (1)). Specifically, as in FS (pp. 352-353), we set the indicator variable for a large decrease or increase in shares held equal to one if the first term of their Eq. (1) or our Eq. (3) (the numerator change) is more than 2.5% in absolute value, and that in shares outstanding equal to one if the second term (the denominator change) exceeds 2.5% in absolute value (see Section 3-3-1).

The first explanatory variable is the level of *m* lagged by one period. The other explanatory variables are expressed as changes, and all accounting variables are calculated as changes from two fiscal years prior to the end of the previous fiscal year (for variable descriptions, see Appendix A). *Lagged industry-adj. return* and *lagged market return* are those over the previous fiscal year. A financially constrained (unconstrained) indicator variable is equal to one if the firm becomes financially constrained (unconstrained). A no R&D dummy that is equal to one if the firm has missing research and development expenditures for a fiscal year is included in the regressions, but not reported.

Year fixed effects are controlled in the regressions. Standard errors are corrected for clustering at the firm level, but not reported. For other points, see Table 2.

Table 4(B). Continued.

| | All firms | | | | | | Young firms | | Mature firms | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Large drop | | | Large increase | | | Large drop | Large increase | Large drop | Large increase |
| | All | Numerator decrease | Denominator increase | All | Numerator increase | Denominator decrease | All | All | All | All |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
| *Level of managerial ownership* | 3.84 *** | 3.63 *** | 3.16 *** | 0.69 *** | 0.59 *** | 1.20 *** | 2.82 *** | -0.31 ** | 4.78 *** | 1.34 *** |
| *Change in managerial ownership* | -0.69 *** | -0.63 *** | -0.51 | -4.38 *** | -4.38 *** | -2.64 *** | -0.25 | -3.39 *** | -0.82 ** | -5.40 *** |
| *Change in R&D/assets* | 0.91 | -0.28 | 2.11 | -2.49 | -1.61 | -4.52 * | 0.26 | -1.54 | 2.84 | -5.69 ** |
| *Change in log (assets)* | 0.22 *** | 0.18 ** | 0.36 *** | 0.03 | 0.06 | 0.01 | 0.25 *** | 0.11 | 0.11 | -0.26 |
| *Change in capex/assets* | -0.00 | 0.10 | -0.54 | -0.13 | -0.06 | 0.18 | 0.04 | 0.24 | -0.04 | -0.53 |
| *Change in cash flow* | -0.05 *** | -0.06 *** | -0.02 | -0.00 | -0.00 | 0.00 | -0.04 *** | -0.00 | 0.06 | -0.15 |
| *Change in PPE/assets* | 0.37 | 0.15 | 0.16 | 0.31 | 0.35 | 0.54 | 0.57 | -0.16 | 0.01 | 0.78 |
| *Change in leverage* | 0.58 *** | 0.33 * | 1.27 *** | 0.24 | 0.30 | 0.36 | 0.71 *** | 0.22 | 0.17 | 0.28 |
| *Became financially constrained* | 0.20 *** | 0.14 ** | 0.25 *** | 0.28 *** | 0.30 *** | 0.32 *** | 0.25 *** | 0.30 *** | 0.13 | 0.22 ** |
| *Became financially unconstrained* | -0.06 | -0.12 * | 0.09 | 0.08 | 0.04 | 0.26 ** | 0.01 | 0.14 | -0.12 | 0.05 |
| *Change in turnover* | 4.20 *** | 2.80 | 7.22 *** | -0.12 | 0.57 | 2.89 | 3.58 | 1.46 | 4.68 ** | -2.41 |
| *Change in idiosyncratic volatility* | 0.02 * | 0.01 | 0.07 *** | 0.02 | 0.02 | 0.06 ** | 0.03 * | -0.02 | 0.01 | 0.06 *** |
| *Concurrent industry-adj. return* | 0.06 *** | 0.05 *** | 0.13 *** | 0.02 | 0.02 | 0.05 ** | 0.07 *** | -0.00 | 0.01 | 0.05 |
| *Concurrent market return* | 0.24 ** | 0.18 * | 0.48 *** | -0.16 | -0.18 | -0.33 | 0.31 ** | -0.26 | 0.21 | -0.02 |
| *Lagged industry-adj. return* | 0.06 *** | 0.04 ** | 0.14 *** | 0.12 *** | 0.12 *** | 0.08 *** | 0.07 *** | 0.09 *** | 0.02 | 0.15 *** |
| *Lagged market return* | -0.15 | -0.12 | -0.10 | -0.07 | -0.09 | -0.15 | -0.16 | -0.14 | -0.11 | 0.11 |
| *Concurrent change in CEO* | 0.55 *** | 0.61 *** | -0.04 | 0.01 | 0.01 | 0.11 * | 0.59 *** | 0.03 | 0.56 *** | 0.01 |
| *Change in analyst coverage* | 0.02 | 0.03 | 0.04 | -0.04 | -0.03 | 0.04 | 0.04 | -0.01 | 0.03 | -0.05 |
| #Obs. | 48,206 | 48,206 | 48,206 | 48,206 | 48,206 | 48,206 | 12,079 | 12,079 | 36,127 | 36,127 |
| Pseudo R-squared | 0.20 | 0.19 | 0.25 | 0.09 | 0.09 | 0.12 | 0.14 | 0.08 | 0.19 | 0.08 |

Table 5. Determinants of Tobin's *q*

(A) Adjusted Fama-MacBeth regressions

In the spirit of FFST (p. 48 Table 2 Panel A), this table reports estimates of adjusted FM regressions of Tobin's *q* on managerial ownership and HHP control variables. For other points, see Table 2.

| | All firms | | | 500 largest firms | | | Young firms | | | Mature firms | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) |
| ***m*** | **0.38 *** ** | | **0.06** | **0.14** | | **0.17** | **0.27 *** ** | | **0.19** | **-0.15** | | **-0.40** |
| | **(0.12)** | | **(0.33)** | **(0.11)** | | **(0.17)** | **(0.04)** | | **(0.26)** | **(0.14)** | | **(0.36)** |
| ***m^2*** | | | **0.71** | | | **-0.06** | | | **0.24** | | | **0.75** |
| | | | **(0.45)** | | | **(0.35)** | | | **(0.50)** | | | **(0.61)** |
| ***m1*** | | **-1.05 *** ** | | | **-0.64 ** ** | | | **-0.50** | | | **-1.05 *** ** | |
| | | **(0.32)** | | | **(0.25)** | | | **(0.73)** | | | **(0.39)** | |
| ***m2*** | | **0.50 *** ** | | | **0.61 ** ** | | | **0.37 ** ** | | | **0.04** | |
| | | **(0.18)** | | | **(0.30)** | | | **(0.15)** | | | **(0.12)** | |
| ***m3*** | | **0.59 *** ** | | | **-0.41** | | | **0.35 ** ** | | | **-0.00** | |
| | | **(0.14)** | | | **(0.40)** | | | **(0.14)** | | | **(0.13)** | |
| *LN(S)* | -0.53 *** | -0.53 *** | -0.53 *** | 0.81 *** | 0.82 *** | 0.81 *** | -0.76 *** | -0.75 *** | -0.76 *** | -0.19 *** | -0.19 *** | -0.18 *** |
| | (0.12) | (0.12) | (0.12) | (0.08) | (0.09) | (0.08) | (0.14) | (0.14) | (0.15) | (0.05) | (0.05) | (0.05) |
| *(LN(S))^2* | 0.02 *** | 0.02 *** | 0.02 *** | -0.03 *** | -0.03 *** | -0.03 *** | 0.03 *** | 0.03 *** | 0.03 *** | 0.01 *** | 0.01 *** | 0.01 *** |
| | (0.01) | (0.00) | (0.01) | (0.00) | (0.00) | (0.00) | (0.01) | (0.01) | (0.01) | (0.00) | (0.00) | (0.00) |
| *K/S* | -0.18 *** | -0.18 *** | -0.18 *** | -0.28 * | -0.29 * | -0.28 * | -0.37 *** | -0.37 *** | -0.37 *** | -0.06 | -0.06 | -0.06 |
| | (0.06) | (0.06) | (0.06) | (0.17) | (0.16) | (0.16) | (0.13) | (0.13) | (0.13) | (0.06) | (0.06) | (0.06) |
| *(K/S)^2* | 0.02 ** | 0.02 ** | 0.02 ** | 0.03 | 0.03 | 0.03 | 0.06 | 0.06 | 0.06 | 0.01 | 0.01 | 0.01 |
| | (0.01) | (0.01) | (0.01) | (0.04) | (0.04) | (0.04) | (0.04) | (0.04) | (0.04) | (0.01) | (0.01) | (0.01) |
| *Y/S* | 0.21 ** | 0.22 ** | 0.22 ** | 5.08 *** | 5.09 *** | 5.08 *** | 0.20 ** | 0.20 ** | 0.20 ** | 1.17 *** | 1.18 *** | 1.17 *** |
| | (0.09) | (0.09) | (0.09) | (0.72) | (0.72) | (0.71) | (0.08) | (0.08) | (0.08) | (0.38) | (0.38) | (0.38) |
| *RDK* | 0.05 | 0.05 | 0.05 | -0.00 | -0.01 | -0.00 | 0.03 | 0.03 | 0.03 | 0.12 ** | 0.12 ** | 0.12 ** |
| | (0.03) | (0.03) | (0.03) | (0.09) | (0.09) | (0.09) | (0.03) | (0.03) | (0.03) | (0.06) | (0.06) | (0.06) |
| *RDUM* | -0.00 | -0.00 | -0.00 | -0.05 *** | -0.05 *** | -0.05 *** | 0.03 | 0.03 | 0.03 | -0.02 | -0.02 | -0.02 |
| | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.03) | (0.03) | (0.03) | (0.02) | (0.02) | (0.02) |
| *A/K* | 0.02 *** | 0.02 *** | 0.02 *** | 0.31 | 0.30 | 0.31 | 0.02 *** | 0.02 *** | 0.02 *** | 0.07 | 0.07 | 0.07 |
| | (0.01) | (0.01) | (0.01) | (0.20) | (0.21) | (0.21) | (0.00) | (0.00) | (0.00) | (0.06) | (0.06) | (0.06) |
| *ADUM* | 0.01 | 0.02 | 0.01 | -0.00 | 0.00 | -0.00 | 0.09 | 0.09 | 0.09 | 0.01 | 0.01 | 0.01 |
| | (0.03) | (0.02) | (0.02) | (0.06) | (0.06) | (0.06) | (0.07) | (0.06) | (0.06) | (0.01) | (0.01) | (0.01) |
| *I/K* | 0.03 *** | 0.03 *** | 0.03 *** | 0.34 *** | 0.33 *** | 0.34 *** | 0.03 ** | 0.03 ** | 0.03 ** | 0.18 * | 0.18 * | 0.18 * |
| | (0.01) | (0.01) | (0.01) | (0.08) | (0.08) | (0.08) | (0.02) | (0.02) | (0.02) | (0.11) | (0.11) | (0.11) |
| *SIGMA* | 0.25 *** | 0.24 *** | 0.24 *** | 0.63 *** | 0.63 *** | 0.62 ** | 0.20 *** | 0.20 *** | 0.20 *** | 1.43 *** | 1.42 *** | 1.43 *** |
| | (0.04) | (0.04) | (0.04) | (0.24) | (0.25) | (0.24) | (0.04) | (0.04) | (0.04) | (0.38) | (0.38) | (0.38) |
| #Obs. | 59,064 | 59,064 | 59,064 | 9,000 | 9,000 | 9,000 | 18,366 | 18,366 | 18,366 | 40,698 | 40,698 | 40,698 |
| Avg. R-squared | 0.24 | 0.24 | 0.24 | 0.51 | 0.51 | 0.51 | 0.26 | 0.26 | 0.26 | 0.22 | 0.23 | 0.22 |
| Year FE | No | No | No | No | No | No | No | No | No | No | No | No |
| Industry FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

Table 5. Continued.

(B) OLS regressions

In the spirit of FFST (p. 49 Table 2 Panel B), this table reports results of OLS regressions of Tobin's *q* on managerial ownership and HHP control variables. For other points, see Table 2.

| | All firms | | | 500 largest firms | | | Young firms | | | Mature firms | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) |
| ***m*** | **0.45 *** ** | | **0.09** | **0.21** | | **0.30** | **0.38 *** ** | | **0.20** | **-0.02** | | **-0.24** |
| | **(0.05)** | | **(0.12)** | **(0.21)** | | **(0.47)** | **(0.07)** | | **(0.16)** | **(0.08)** | | **(0.16)** |
| ***m^2*** | | | **0.76 *** ** | | | **-0.25** | | | **0.34** | | | **0.64 *** |
| | | | **(0.23)** | | | **(0.96)** | | | **(0.28)** | | | **(0.37)** |
| ***m1*** | | **-1.01 *** ** | | | **-0.78** | | | **-0.91** | | | **-0.83 *** ** | |
| | | **(0.37)** | | | **(0.98)** | | | **(0.66)** | | | **(0.39)** | |
| ***m2*** | | **0.54 *** ** | | | **0.84** | | | **0.45 *** ** | | | **0.14** | |
| | | **(0.13)** | | | **(0.74)** | | | **(0.19)** | | | **(0.15)** | |
| ***m3*** | | **0.68 *** ** | | | **-0.47** | | | **0.48 *** ** | | | **0.13** | |
| | | **(0.13)** | | | **(0.73)** | | | **(0.14)** | | | **(0.21)** | |
| *LN(S)* | -0.51 *** | -0.50 *** | -0.51 *** | 0.87 *** | 0.88 *** | 0.87 *** | -0.65 *** | -0.64 *** | -0.64 *** | -0.20 *** | -0.20 *** | -0.20 *** |
| | (0.04) | (0.04) | (0.04) | (0.19) | (0.20) | (0.19) | (0.07) | (0.07) | (0.07) | (0.05) | (0.05) | (0.05) |
| *(LN(S))^2* | 0.02 *** | 0.02 *** | 0.02 *** | -0.03 *** | -0.03 *** | -0.03 *** | 0.03 *** | 0.03 *** | 0.03 *** | 0.01 *** | 0.01 *** | 0.01 *** |
| | (0.00) | (0.00) | (0.00) | (0.01) | (0.01) | (0.01) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| *K/S* | -0.08 *** | -0.08 *** | -0.08 *** | -0.25 *** | -0.25 *** | -0.25 *** | -0.10 *** | -0.10 *** | -0.10 *** | -0.08 *** | -0.09 *** | -0.08 *** |
| | (0.02) | (0.02) | (0.02) | (0.08) | (0.07) | (0.08) | (0.03) | (0.03) | (0.03) | (0.02) | (0.02) | (0.02) |
| *(K/S)^2* | 0.00 *** | 0.00 *** | 0.00 *** | 0.03 | 0.03 | 0.03 | 0.00 *** | 0.00 *** | 0.00 *** | 0.01 *** | 0.01 *** | 0.01 *** |
| | (0.00) | (0.00) | (0.00) | (0.02) | (0.02) | (0.02) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| *Y/S* | -0.00 ** | -0.00 ** | -0.00 ** | 4.72 *** | 4.72 *** | 4.72 *** | -0.00 | -0.00 | -0.00 | 0.23 | 0.23 | 0.23 |
| | (0.00) | (0.00) | (0.00) | (0.33) | (0.32) | (0.32) | (0.00) | (0.00) | (0.00) | (0.17) | (0.17) | (0.17) |
| *RDK* | 0.01 *** | 0.01 *** | 0.01 *** | 0.07 | 0.06 | 0.07 | 0.00 ** | 0.00 ** | 0.00 ** | 0.05 *** | 0.05 *** | 0.05 *** |
| | (0.00) | (0.00) | (0.00) | (0.12) | (0.12) | (0.12) | (0.00) | (0.00) | (0.00) | (0.01) | (0.02) | (0.01) |
| *RDUM* | 0.00 | 0.00 | 0.00 | -0.05 | -0.05 | -0.05 | 0.02 | 0.02 | 0.02 | -0.01 | -0.01 | -0.01 |
| | (0.02) | (0.02) | (0.02) | (0.04) | (0.04) | (0.04) | (0.03) | (0.03) | (0.03) | (0.02) | (0.02) | (0.02) |
| *A/K* | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 *** | 0.02 *** | 0.02 *** |
| | (0.00) | (0.00) | (0.00) | (0.06) | (0.05) | (0.06) | (0.00) | (0.00) | (0.00) | (0.01) | (0.01) | (0.01) |
| *ADUM* | 0.02 | 0.02 | 0.02 | 0.01 | 0.01 | 0.01 | 0.06 *** | 0.06 *** | 0.06 *** | 0.01 | 0.01 | 0.01 |
| | (0.01) | (0.01) | (0.01) | (0.02) | (0.02) | (0.02) | (0.02) | (0.02) | (0.02) | (0.01) | (0.01) | (0.01) |
| *I/K* | 0.02 *** | 0.02 *** | 0.02 *** | 0.35 *** | 0.35 *** | 0.35 *** | 0.02 *** | 0.02 *** | 0.02 *** | 0.01 * | 0.01 * | 0.01 * |
| | (0.00) | (0.00) | (0.00) | (0.09) | (0.09) | (0.09) | (0.00) | (0.00) | (0.00) | (0.01) | (0.01) | (0.01) |
| *SIGMA* | 0.18 *** | 0.18 *** | 0.18 *** | 0.41 *** | 0.42 *** | 0.41 ** | 0.14 *** | 0.14 *** | 0.14 *** | 1.12 *** | 1.11 *** | 1.12 *** |
| | (0.02) | (0.02) | (0.02) | (0.16) | (0.16) | (0.16) | (0.01) | (0.01) | (0.01) | (0.10) | (0.10) | (0.10) |
| #Obs. | 59,064 | 59,064 | 59,064 | 9,000 | 9,000 | 9,000 | 18,366 | 18,366 | 18,366 | 40,698 | 40,698 | 40,698 |
| R-squared | 0.25 | 0.25 | 0.25 | 0.47 | 0.47 | 0.47 | 0.27 | 0.27 | 0.27 | 0.22 | 0.22 | 0.22 |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Industry FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

Table 5. Continued.

(C) Panel regressions

As in HHP (pp. 374-375 Table 5(A), pp. 376-377 Table 5(B)), the specifications reported in these tables all model Tobin's *q* as a function of the explanatory variables indicated below. In the left table (Table 5(C)(a)), the influence of *m* enters as a quadratic function, whereas spline specifications are adopted in the right table (Table 5(C)(b)). For other points, see Table 2.

(a) Quadratic specifications

| | (1) | (2) | (3) |
|---|---|---|---|
| ***m*** | **0.38** *** | **0.09** | **-0.13** |
| | **(0.12)** | **(0.12)** | **(0.16)** |
| ***m^2*** | **0.45** * | **0.76** *** | **0.41** |
| | **(0.24)** | **(0.23)** | **(0.30)** |
| *LN(S)* | -0.63 *** | -0.51 *** | -0.47 *** |
| | (0.04) | (0.04) | (0.10) |
| *(LN(S))^2* | 0.03 *** | 0.02 *** | 0.02 *** |
| | (0.00) | (0.00) | (0.00) |
| *K/S* | -0.08 *** | -0.08 *** | -0.11 *** |
| | (0.02) | (0.02) | (0.02) |
| *(K/S)^2* | 0.00 *** | 0.00 *** | 0.00 *** |
| | (0.00) | (0.00) | (0.00) |
| *SIGMA* | 0.19 *** | 0.18 *** | 0.13 *** |
| | (0.02) | (0.02) | (0.02) |
| *Y/S* | -0.00 | -0.00 ** | -0.01 ** |
| | (0.00) | (0.00) | (0.00) |
| *RDK* | 0.01 *** | 0.01 *** | 0.00 |
| | (0.00) | (0.00) | (0.00) |
| *RDUM* | -0.05 *** | 0.00 | -0.03 |
| | (0.01) | (0.02) | (0.02) |
| *A/K* | 0.00 | 0.00 | 0.00 |
| | (0.00) | (0.00) | (0.00) |
| *ADUM* | 0.05 *** | 0.02 | -0.01 |
| | (0.01) | (0.01) | (0.01) |
| *I/K* | 0.03 *** | 0.02 *** | 0.00 |
| | (0.01) | (0.00) | (0.00) |
| #Obs. | 59,064 | 59,064 | 59,064 |
| Year FE | Yes | Yes | Yes |
| Industry FE | No | Yes | No |
| Firm FE | No | No | Yes |

(b) Spline specifications

| | (1) | (2) | (3) |
|---|---|---|---|
| ***m1*** | **-1.01** *** | **-1.01** *** | **-0.28** |
| | **(0.39)** | **(0.37)** | **(0.42)** |
| ***m2*** | **0.84** *** | **0.54** *** | **-0.01** |
| | **(0.14)** | **(0.13)** | **(0.13)** |
| ***m3*** | **0.66** *** | **0.68** *** | **0.23** |
| | **(0.13)** | **(0.13)** | **(0.14)** |
| *LN(S)* | -0.63 *** | -0.50 *** | -0.47 *** |
| | (0.04) | (0.04) | (0.10) |
| *(LN(S))^2* | 0.03 *** | 0.02 *** | 0.02 *** |
| | (0.00) | (0.00) | (0.00) |
| *K/S* | -0.09 *** | -0.08 *** | -0.11 *** |
| | (0.02) | (0.02) | (0.02) |
| *(K/S)^2* | 0.00 *** | 0.00 *** | 0.00 *** |
| | (0.00) | (0.00) | (0.00) |
| *SIGMA* | 0.19 *** | 0.18 *** | 0.13 *** |
| | (0.02) | (0.02) | (0.02) |
| *Y/S* | -0.00 * | -0.00 ** | -0.01 ** |
| | (0.00) | (0.00) | (0.00) |
| *RDK* | 0.01 *** | 0.01 *** | 0.00 |
| | (0.00) | (0.00) | (0.00) |
| *RDUM* | -0.06 *** | 0.00 | -0.03 |
| | (0.01) | (0.02) | (0.02) |
| *A/K* | 0.00 | 0.00 | 0.00 |
| | (0.00) | (0.00) | (0.00) |
| *ADUM* | 0.05 *** | 0.02 | -0.01 |
| | (0.01) | (0.01) | (0.01) |
| *I/K* | 0.03 *** | 0.02 *** | 0.00 |
| | (0.01) | (0.00) | (0.00) |
| #Obs. | 59,064 | 59,064 | 59,064 |
| Year FE | Yes | Yes | Yes |
| Industry FE | No | Yes | No |
| Firm FE | No | No | Yes |

Table 5. Continued.

(D) OLS regressions: additional robustness tests

In the spirit of FFST (p. 50 Table 3), this table reports estimates of OLS regressions of Tobin's $q$ on managerial ownership and HHP control variables in spline specifications. Column (1) reproduces the result provided in column (2) in Table 5(B). In column (2), year and industry fixed effects are replaced by industry x year fixed effects. The results of a median regression are shown in column (3), and standard errors robust to clustering at firm-level are reported in parentheses. The dependent variable is transformed into the natural logarithm of Tobin's $q$ in column (4), and into $-(1/q)$ in column (5) (for the transformation, see Section 4-3). For other points, see Table 2.

| | Tobin's $q$ | | | LN(Tobin's $q$) | -(1/$q$) |
|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) |
| ***m1*** | **-1.01 ***** | **-1.04 ***** | **-1.03 ***** | **-0.94 ***** | **-0.99 ***** |
| | **(0.37)** | **(0.37)** | **(0.21)** | **(0.27)** | **(0.28)** |
| ***m2*** | **0.54 ***** | **0.54 ***** | **0.36 ***** | **0.45 ***** | **0.46 ***** |
| | **(0.13)** | **(0.13)** | **(0.08)** | **(0.09)** | **(0.09)** |
| ***m3*** | **0.68 ***** | **0.68 ***** | **0.37 ***** | **0.40 ***** | **0.31 ***** |
| | **(0.13)** | **(0.13)** | **(0.08)** | **(0.07)** | **(0.07)** |
| *LN(S)* | -0.50 *** | -0.51 *** | -0.19 *** | -0.28 *** | -0.15 *** |
| | (0.04) | (0.04) | (0.03) | (0.03) | (0.03) |
| *(LN(S))^2* | 0.02 *** | 0.02 *** | 0.01 *** | 0.01 *** | 0.01 *** |
| | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| *K/S* | -0.08 *** | -0.08 *** | -0.02 ** | -0.05 *** | -0.04 *** |
| | (0.02) | (0.02) | (0.01) | (0.01) | (0.01) |
| *(K/S)^2* | 0.00 *** | 0.00 *** | 0.00 *** | 0.00 *** | 0.00 *** |
| | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| *Y/S* | -0.00 ** | -0.00 ** | -0.00 *** | -0.00 | -0.00 |
| | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| *RDK* | 0.01 *** | 0.01 *** | 0.02 | 0.00 *** | 0.00 * |
| | (0.00) | (0.00) | (0.02) | (0.00) | (0.00) |
| *RDUM* | 0.00 | 0.00 | -0.00 | -0.00 | -0.01 |
| | (0.02) | (0.02) | (0.01) | (0.01) | (0.01) |
| *A/K* | 0.00 | 0.00 | 0.01 *** | 0.00 | 0.00 * |
| | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| *ADUM* | 0.02 | 0.02 | -0.01 | 0.00 | -0.01 |
| | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) |
| *I/K* | 0.02 *** | 0.02 *** | 0.04 *** | 0.01 *** | 0.01 ** |
| | (0.00) | (0.00) | (0.02) | (0.00) | (0.00) |
| *SIGMA* | 0.18 *** | 0.18 *** | 0.29 *** | 0.10 *** | 0.07 *** |
| | (0.02) | (0.02) | (0.06) | (0.01) | (0.01) |
| #Obs. | 59,064 | 59,064 | 59,064 | 59,064 | 59,064 |
| R-squared | 0.25 | 0.27 | 0.20 | 0.27 | 0.18 |
| Year FE | Yes | No | Yes | Yes | Yes |
| Industry FE | Yes | No | Yes | Yes | Yes |
| Industry x Year FE | No | Yes | No | No | No |

Table 6. Managerial ownership and Tobin's *q* conditioning on past liquidity

This table reports estimates of adjusted FM and OLS regressions of Tobin's *q* on managerial ownership and HHP control variables conditioning on liquidity history. "High liquidity" or "low liquidity" in the table specifies the years during the sample period that a firm spent in the high or low liquidity bracket, which means the top or bottom quartile of the annual liquidity distribution. This table is comparable to that of FFST (p. 51 Table 4). For other points, see Table 2.

| | Fama-MacBeth regressions | | | | OLS regressions | | | |
|---|---|---|---|---|---|---|---|---|
| | High liquidity | | Low liquidity | | High liquidity | | Low liquidity | |
| | Amihud | FHT | Amihud | FHT | Amihud | FHT | Amihud | FHT |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| ***m*** | **0.73** ** | **0.55** | **-0.39** ** | **-0.67** *** | **1.06** *** | **0.44** | **-0.36** *** | **-0.78** *** |
| | **(0.36)** | **(0.40)** | **(0.17)** | **(0.12)** | **(0.28)** | **(0.28)** | **(0.11)** | **(0.14)** |
| ***m^2*** | **0.24** | **-0.11** | **0.86** *** | **1.40** *** | **-0.16** | **0.97** | **0.82** *** | **1.70** *** |
| | **(0.78)** | **(0.79)** | **(0.31)** | **(0.27)** | **(0.53)** | **(0.61)** | **(0.20)** | **(0.32)** |
| *LN(S)* | -0.61 *** | -0.64 *** | -0.62 *** | -0.93 *** | -0.59 *** | -0.68 *** | -0.60 *** | -0.95 *** |
| | (0.10) | (0.09) | (0.10) | (0.15) | (0.05) | (0.07) | (0.08) | (0.09) |
| *(LN(S))^2* | 0.02 *** | 0.03 *** | 0.03 *** | 0.04 *** | 0.02 *** | 0.03 *** | 0.03 *** | 0.05 *** |
| | (0.00) | (0.00) | (0.00) | (0.01) | (0.00) | (0.00) | (0.00) | (0.00) |
| *K/S* | -0.24 *** | -0.18 *** | -0.14 *** | -0.20 *** | -0.09 *** | -0.06 *** | -0.11 *** | -0.16 *** |
| | (0.09) | (0.03) | (0.03) | (0.06) | (0.02) | (0.02) | (0.03) | (0.02) |
| *(K/S)^2* | 0.03 | 0.02 *** | 0.02 *** | 0.02 *** | 0.00 *** | 0.00 ** | 0.01 *** | 0.01 *** |
| | (0.02) | (0.01) | (0.01) | (0.01) | (0.00) | (0.00) | (0.00) | (0.00) |
| *Y/S* | 0.53 *** | 1.43 *** | 0.82 *** | -0.04 | -0.00 * | 0.03 | 0.28 | 0.01 *** |
| | (0.15) | (0.32) | (0.25) | (0.17) | (0.00) | (0.03) | (0.17) | (0.00) |
| *RDK* | 0.07 ** | 0.14 * | 0.02 | 0.00 | 0.01 *** | 0.01 *** | 0.01 | 0.01 |
| | (0.03) | (0.08) | (0.07) | (0.02) | (0.00) | (0.00) | (0.02) | (0.01) |
| *RDUM* | 0.07 *** | -0.06 * | -0.05 *** | -0.02 | 0.05 | -0.04 | -0.05 ** | -0.03 |
| | (0.03) | (0.03) | (0.02) | (0.02) | (0.04) | (0.03) | (0.02) | (0.02) |
| *A/K* | 0.03 ** | 0.10 ** | 0.07 | 0.05 * | 0.02 *** | 0.00 | 0.01 *** | 0.02 *** |
| | (0.01) | (0.05) | (0.07) | (0.03) | (0.00) | (0.00) | (0.00) | (0.01) |
| *ADUM* | 0.08 * | 0.03 | -0.01 | -0.02 * | 0.07 *** | 0.05 ** | -0.01 | -0.02 * |
| | (0.04) | (0.03) | (0.01) | (0.01) | (0.02) | (0.02) | (0.01) | (0.01) |
| *I/K* | 0.06 *** | 0.17 ** | 0.08 ** | 0.05 | 0.01 ** | 0.05 *** | 0.01 | 0.01 * |
| | (0.02) | (0.07) | (0.03) | (0.03) | (0.01) | (0.02) | (0.01) | (0.01) |
| *SIGMA* | 0.08 *** | 0.11 *** | 0.99 *** | 0.52 *** | 0.07 *** | 0.08 *** | 0.72 *** | 0.38 *** |
| | (0.02) | (0.02) | (0.31) | (0.13) | (0.01) | (0.01) | (0.10) | (0.04) |
| #Obs. | 14,755 | 14,752 | 14,773 | 14,770 | 14,755 | 14,752 | 14,773 | 14,770 |
| (Avg.) R-squared | 0.36 | 0.35 | 0.29 | 0.39 | 0.36 | 0.29 | 0.23 | 0.34 |
| Year FE | No | No | No | No | Yes | Yes | Yes | Yes |
| Industry FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

Table 7. The effect of ownership change on Tobin's *q*

In the spirit of FFST (p. 52 Table 5), this table reports estimates of OLS regressions of Tobin's *q* on the ownership change and the HHP control variables. The explanatory variable *ownership change* is defined as the difference between initial *m* (first observation for a firm) and present *m* lagged by one period. "Post-IPO" refers to the subset of firms that experience an IPO during the sample period. For other points, see Table 2.

| | All | | | Post-IPO |
|---|---|---|---|---|
| | All firms | Young firms | Mature firms | All firms |
| | (1) | (2) | (3) | (4) |
| ***Ownership change*** | **0.31 *** ** | **0.19 ** ** | **0.51 *** ** | **0.19 ** ** |
| | **(0.07)** | **(0.09)** | **(0.08)** | **(0.09)** |
| *LN(S)* | -0.32 *** | -0.37 *** | -0.16 *** | -0.35 *** |
| | (0.04) | (0.07) | (0.04) | (0.07) |
| *(LN(S))^2* | 0.02 *** | 0.02 *** | 0.01 *** | 0.02 *** |
| | (0.00) | (0.00) | (0.00) | (0.00) |
| *K/S* | -0.05 *** | -0.08 *** | -0.07 *** | -0.07 *** |
| | (0.02) | (0.02) | (0.02) | (0.02) |
| *(K/S)^2* | 0.00 *** | 0.00 *** | 0.01 *** | 0.00 *** |
| | (0.00) | (0.00) | (0.00) | (0.00) |
| *Y/S* | 0.03 ** | 0.02 *** | 0.25 | 0.02 *** |
| | (0.01) | (0.01) | (0.18) | (0.01) |
| *RDK* | 0.01 * | 0.00 | 0.05 *** | 0.00 |
| | (0.01) | (0.01) | (0.02) | (0.01) |
| *RDUM* | -0.00 | 0.02 | -0.01 | 0.04 |
| | (0.02) | (0.03) | (0.02) | (0.03) |
| *A/K* | 0.00 * | 0.00 | 0.02 ** | 0.00 |
| | (0.00) | (0.00) | (0.01) | (0.00) |
| *ADUM* | 0.01 | 0.05 ** | 0.00 | 0.08 *** |
| | (0.01) | (0.02) | (0.01) | (0.03) |
| *I/K* | 0.02 *** | 0.02 *** | 0.01 * | 0.01 *** |
| | (0.00) | (0.00) | (0.01) | (0.00) |
| *SIGMA* | 1.40 *** | 1.73 *** | 1.11 *** | 2.08 *** |
| | (0.09) | (0.11) | (0.11) | (0.14) |
| #Obs. | 53,401 | 14,983 | 38,418 | 13,962 |
| R-squared | 0.23 | 0.26 | 0.22 | 0.27 |
| Year FE | Yes | Yes | Yes | Yes |
| Industry FE | Yes | Yes | Yes | Yes |

Figure 1. Ownership structure following an IPO

Following Helwege, Pirinsky and Stulz (2007, p. 1007 Figure 3), this figure shows the distribution of changes in *m* (current fraction minus initial fraction of managerial ownership) in the years after an IPO. We exclude all firms that were widely held at the end of the first year following an IPO (*m* less than 10%). The initial sample is all firms in our paper that went public during the sample period. WH10 or WH20 is the percentage of firms in which *m* is less than 10% or 20%, respectively.

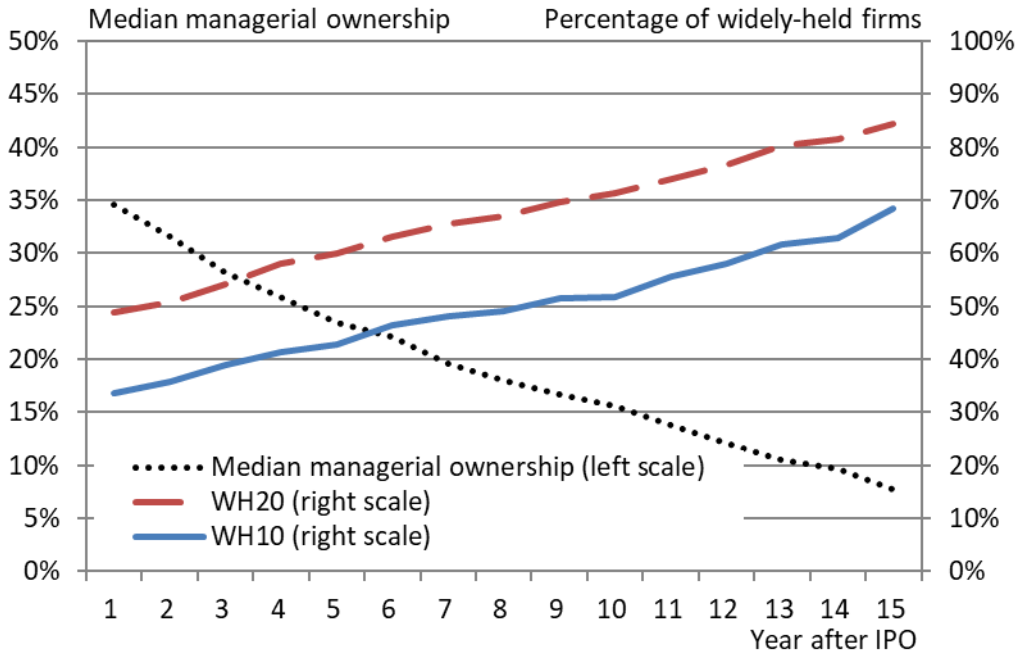
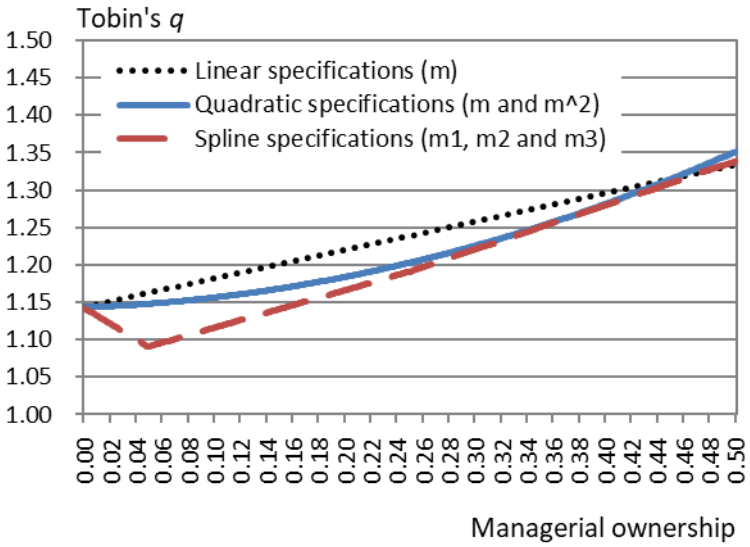


Figure 2. The relation between managerial ownership and Tobin's *q*

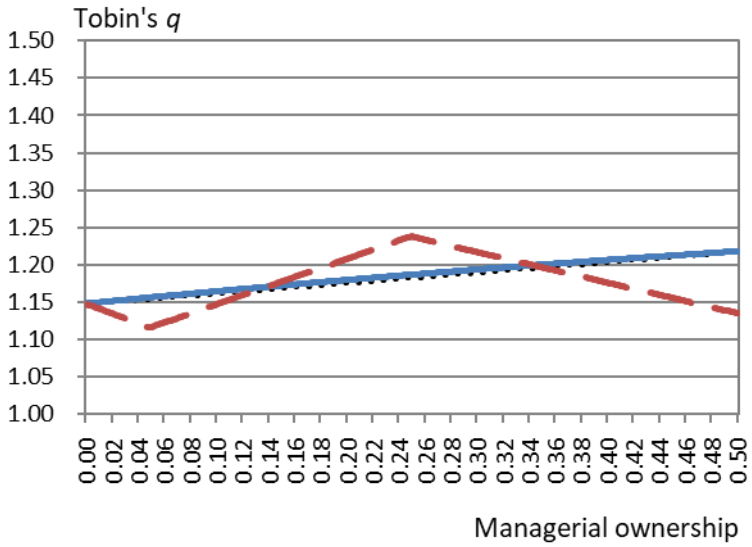
(A) Adjusted Fama-MacBeth regressions

The figures delineate the relation between managerial ownership and Tobin's *q* as implied by the estimates reported in our paper. The linear specification (expressed by the black line), the quadratic specification (the blue line) and the spline specification (the red line) in Figure 2(A)(a) correspond to columns (1), (3) and (2) in Table 5(A), respectively, and those in the Figure 2(A)(b) are based on columns (4), (6) and (5) in the same table, respectively. Similarly, those in Figure 2(A)(c) are founded on columns (7), (9) and (8) in the same table, respectively, and those in Figure 2(A)(d) are grounded on columns (10), (12) and (11) in the same table, respectively. Following MSV (p. 301 Figure 1), the intercepts conform to the mean values reported in Table 1(B). The figures are comparable to those presented graphically in the literature (MSV p. 301 Figure 1; FFST pp. 34-35 Figures 2 and 3).

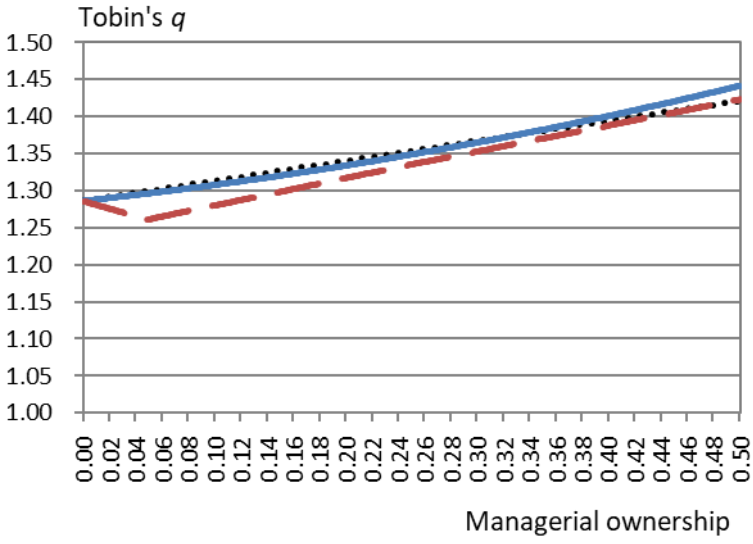
(a) All firms




(b) 500 largest firms




(c) Young firms




(d) Mature firms

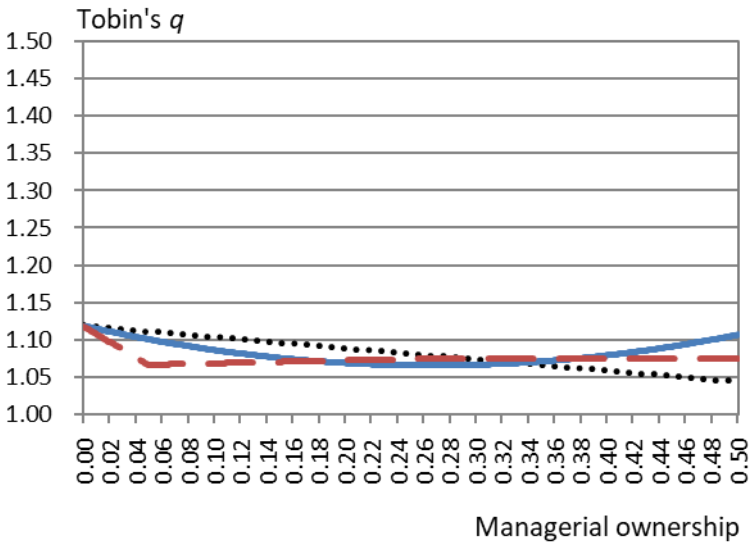
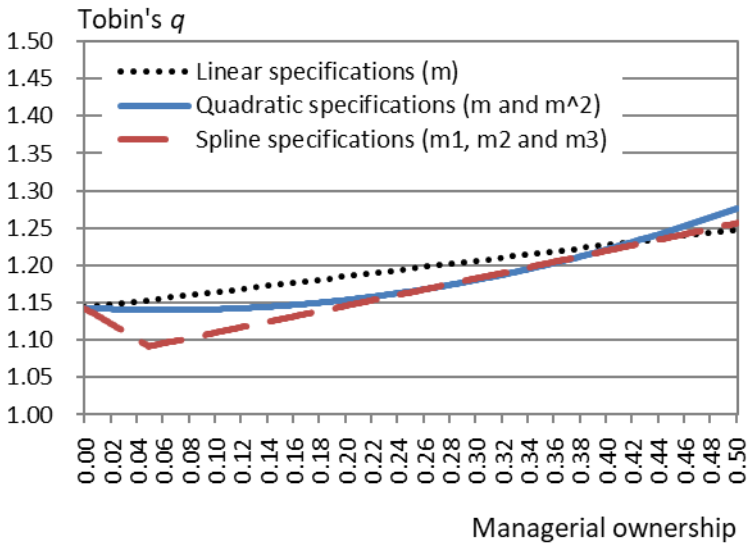


Figure 2. Continued.

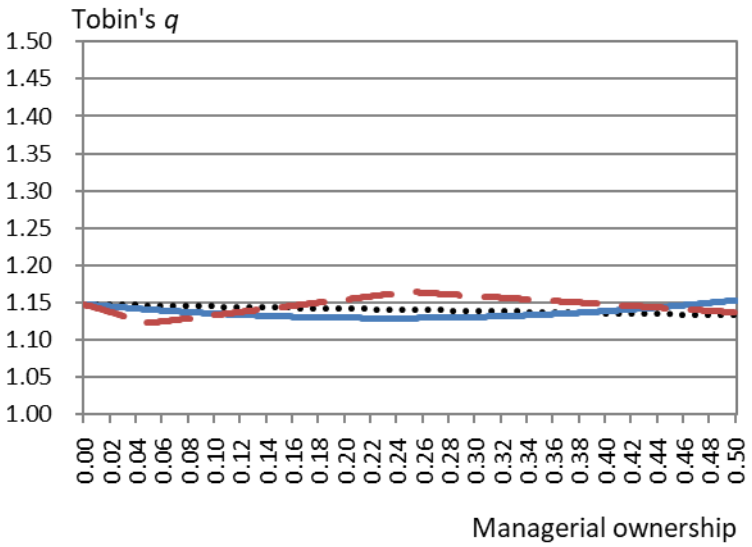
(B) Median regressions: robustness

The figures correspond to Figure 2(A), but the coefficients of ownership terms are estimated by unreported median regressions as a robustness test. The results expressed in spline specifications (the red line) in Figure 2(B)(a) are the same as those reported in column (3) in Table 5(D).

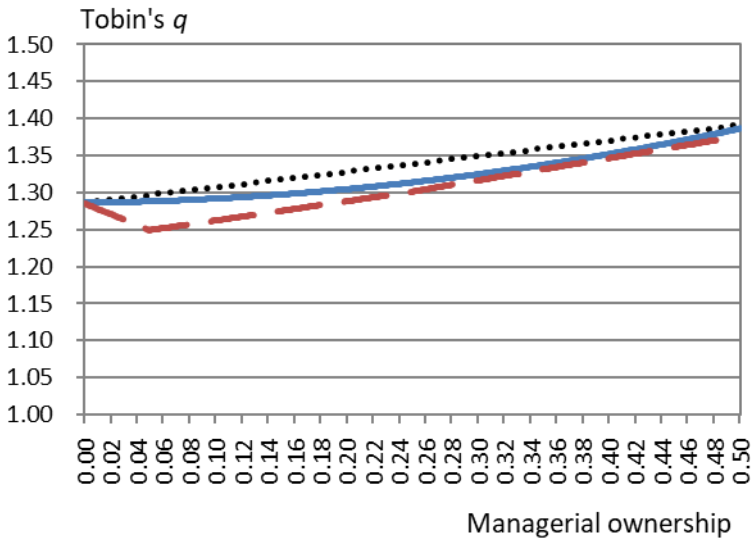
(a) All firms




(b) 500 largest firms




(c) Young firms




(d) Mature firms