

Institutional Investors and Duration of Executive Compensation

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Abstract

This study examines the impact of different types of institutional investors on executive compensation schemes by focusing on the extent to which the compensation is short-term or long-term (i.e. pay duration). When transient institutional investors create short-term incentives for managers, firms will design the explicit compensation contracts to promote long-term incentives of managers. Thus, we hypothesize that firms with a higher level of transient institutional ownership will offer a longer duration pay to their managers. Consistent with this prediction, we find that pay duration is positively associated with the level of transient institutional ownership. The impact of transient institutional ownership is weakened for firms with higher dedicated and independent institutional ownership while dedicated and independent institutional ownership itself is found to lengthen pay duration. In addition, the positive impact of transient institutional ownership on pay duration is found to be stronger for firms with more liquid stocks, where managers face heightened pressure from the short-term institutions. Lastly, an additional analysis shows that higher transient institutional ownership decreases long-term performance but this negative effect is eliminated if executives have a longer pay duration.

Keywords: Executive compensation, vesting schedule, transient institution, pay duration

JEL classification: G30, J33, M52

1. Introduction

Firms use various contracts to align managers' interests with those of shareholders. For instance, CEOs' total pay may be tied to shareholder value, which can be captured in pay-to-performance sensitivity (see, e.g., Jensen and Murphy 1990; Hall and Liebman 1998; Frydman and Saks 2010). Equity-based incentives affect managers' behaviors to maximize firm value (Jensen and Meckling, 1976). Equity-based compensation is also shown to mitigate "managerial disclosure agency problems" by encouraging managers to disclose more (Nagar et al. 2003). Another well-known type of agency conflicts would be a mismatch in "horizon incentives" where shareholder investment horizons do not coincide with the manager's decision horizon (Cadman and Sunder 2014). Managers may make myopic decisions at the expense of long-term firm value. Such short-termism can be induced by institutional investors with short-term investment horizons (Dikolli et al. 2009; Bushee 1998), stringent debt covenants imposed by debtholders (Atanassov 2015) or executive compensation closely linked to annual performance. Although previous studies examine how different features of executive pay may resolve various agency problems, not many studies have focused on vesting periods of executive remuneration (Cadman et al. 2013; Cadman and Sunder 2014). By utilizing a pay duration measure developed by Gopalan et al. (2014), this study investigates how influences of institutional ownership on the vesting schedules, *if any*, are different depending on the types of institutions.

Institutional investors are heterogeneous along the dimensions of investment horizons and monitoring incentives. "Transient" institutions with short investment horizon tend to put more emphasis on a short-term performance compared to "dedicated" long-term institutions (Bushee 1998, 2001; Matsumoto 2002). Such pressure from transient institutions can create an "implicit" incentive for managers to make myopic business decisions and attempt to meet short-term expectations about current earnings (see, for example, Gillan et al. (2009) for implicit contracts). In response to such pressure, however, firms with higher transient institutional ownership may design managerial contracts (i.e., to provide explicit incentives) in a way that mitigates the implicit incentives for short-termism (Dikolli et al. 2009). Dikolli et al. (2009) find that firms with higher transient institutional

ownership place lower weighting on accounting earnings (i.e., short-term performance) and higher weighting on annual stock returns (i.e., long-term firm value) when determining CEO compensation. Also, these firms are more likely to offer equity-based compensations to their CEOs compared to firms with lower transient institutional ownership. However, granting equity-based compensation does not necessarily promote long-term incentives for managers. It may rather induce them to engage in temporary earnings management in order to inflate short-term stock prices at the expense of long-term firm value (Cheng and Warfield 2005; Bergstresser and Philippon 2006; Burns and Kedia 2006). Furthermore, a large amount of stocks or stock options can generate short-term incentive of managers if they have short vesting schedules (Gopalan et al. 2014; Cadman et al. 2010; Bolton et al. 2006; Cadman et al. 2013).

This study investigates the impacts of transient and long-term institutional investors on vesting periods of executive compensation. We examine a measure of pay duration which quantifies the mix of short-term and long-term executive pay components and explicitly considers the length of the vesting schedules of pay components (Gopalan et al. 2014). If firms design executive contracts to reinforce managers' long-term incentives, we expect pay duration to be longer for firms with a higher level of transient institutional ownership. On the other hand, long-term institutional investors may lengthen or shorten pay duration. Long-term institutional investors, especially dedicated and independent (Chen et al. 2007; Ramalingegowda and Yu 2012), may influence the corporate board in order to make executive contracts to be more long-term focused. Thereby, pay duration is expected to be longer when long-term institutional ownership is high. However, since providing longer pay duration is costly (Cadman et al. 2013), active monitoring by long-term institutional investors can be used as a substitute to disciplinary tools embedded in executive contract such as long pay duration. In this case, long-term institutional ownership will be negatively associated with pay duration.

Using the Equilar database of executive compensation, we collect 41,224 firm-year observations for Russell 3000 firms from 2006 to 2011. The pay duration measure used in our analysis captures the extent to which compensation is long-term versus short-term by taking into account the vesting periods of different components of executive compensation (e.g., salary, bonus,

restricted stocks and stock options) (Gopalan et al. 2014). Our focus is the two types of institutional investors such as transient institutions and dedicated institutions. Dedicated institutions are then further classified by their independence from the firm. We use an industry-by-year fixed effects model with cluster-robust standard errors where the Fama-French 48 industry classification excluding financial and utility industries is used as the industry variable. The control variables included in the analysis are financial information variables, stock market variables, and corporate governance variables. The findings show that the prominent presence of transient institutional ownership leads firms to lengthen pay duration, indicating firms design executive contracts considering short-term incentives imposed by transient institutions. Active monitoring by dedicated and independent institutions appears to be used in combination with long pay duration in mitigating the agency problems between shareholders and managers as the ownership level of such institutions is positively associated with pay duration. Finally, dedicated and independent institutions are found to weaken or even eliminate the effect of transient institutions on pay duration. The results are robust to a subsample analysis using only CEOs. Other robustness tests include using alternative measures for the level of dedicated institutional ownership or variation to the fixed effects model. In addition, we find that the impact of transient institutional investors is stronger for firms with highly liquid stocks. Further tests are conducted to examine the impact of pay duration on short-term and long-term firm performance. Longer pay duration is found to incentivize managers to focus on long-term firm performance by moderating the pressure from transient institutions, supporting the main argument of this study.

The current study makes the following contributions to the existing literature. First, our study provides evidence that firms actively choose the vesting schedules of equity awards considering a mix of implicit and explicit incentives of managers. Previous studies document that granting options and restricted stocks is determined by the economic theory of optimal contracting (Core and Guay 1999) or by a tension between boards' and managers' incentives (Ofek and Yermack 2000; Yermack 1995). Firms also choose the vesting terms of equity-based compensation considering various determinants such as investment opportunities, past firm performance, CEO power and a change in reporting

standards (Cadman et al. 2013). Bolton et al. (2006) show in their analytical paper that existing shareholders become more short-term focused in a speculative stock market and they may structure the CEO's compensation more heavily relied on short-term stock price performance. Our study provides further evidence that a mix of different types of institutional shareholders can influence the optimal level of pay duration.

Second, we adopt a direct measure of pay duration to test how firms react to the pressure caused by transient investors when designing executive contracts, supplementing the findings of Dikolli et al. (2009). Although Dikolli et al. (2009) show that a higher ownership of transient institutions is positively associated with the increased provision of equity-based compensation, it has not been directly tested whether a firm's choice on the horizon of executive compensation is also affected by the presence of the short-term focused institutions. Cadman and Sunder (2014) propose a similar measure to pay duration and test the influence of venture capitalists in CEO contracts before and after the initial public offering. Our paper can be differentiated from Cadman and Sunder (2014) by the following points. First, we focus on the response of firms to implicit incentives created by transient institutions who seldom actively participate in a firm's contracting activities because their investment strategy is making short-term profits via frequent trading. This contracting mechanism is in contrast to that associated with venture capitalists who can directly influence compensation design by sitting on the board of directors and compensation committees (Gorman and Sahlman 1989; Berlin 1998). Second, venture capitalists' horizon incentives are changed surrounding IPO while transient institutions would continuously induce short-term incentives for managers.

This paper is structured as follows. Section 2 presents hypotheses followed by data and descriptive statistics in Section 3. The results are presented in Section 4 and Section 5 concludes the paper.

2. Hypotheses

Institutional investors can be classified into three categories based on their investment horizons and trading strategies (Porter 1992; Bushee 1998, 2001). "Transient" institutional investors

typically hold small stakes in numerous firms, involve in frequent trading and make decisions based on short-term measures such as current earnings. On the other hand, “dedicated” institutional investors are more long-term focused with concentrated investment in a few firms and have an incentive to actively monitor these firms. Finally, “quasi-indexers” closely follow indexes or buy-and-hold investment strategies with high diversified portfolios and low turnover. Previous studies document how different types of institutions influence managerial decisions. For instance, a firm with a high ownership by institutions with short-term investment horizon is likely to cut R&D to avoid negative earnings surprises (Bushee 1998), present a stronger association between near-term earnings and stock prices (Bushee 2001), meet or exceed earnings expectation by managing earnings (Matsumoto 2002) and perform worse in merger and acquisitions when it is a bidder or a target (Chen et al. 2007; Gaspar et al. 2005) compared with other firms.

These different types of institutional investors also have impacts on the design of executive compensation schemes in different ways. Given various characteristics, firms will consider both implicit and explicit incentives of managers to achieve optimal contracting (Gillan et al. 2009). Particularly, Dikolli et al. (2009) argue that firms use explicit contractual incentive to attenuate the implicit incentives induced by transient institution in order to achieve an optimal allocation of resources for short-term and long-term projects. [ENREF 14](#) The authors suggest different mechanisms from which transient institutional ownership can influence the structure of executive compensation. First, transient institutions may directly affect the firm’s contracting design. However, this is unlikely because these investors have short-term investment horizons investing in various firms and seldom participate in a firm’s management. On the other hand, the authors argue that firms may change the contracting design as a response to pressure exerted by transient investors. The findings support their second conjecture, showing that firms with higher transient institutional ownership weigh stock returns higher than accounting earnings when determining CEO compensation. Also, these firms are found to be more likely to offer equity-based compensations to their CEOs.

To the extent that transient institutional investors create short-term incentives for managers, firms will design their executive contracts to make managerial investment horizon close to the optimal

level. More specifically, we expect firms to change the vesting schedules of compensation components to mitigate managers' short horizon incentives that arise due to a high ownership of transient institutions. Lengthening the vesting schedules means longer holding investment horizon of managers, which in turn can extend the management decision horizon for operating and financing activities (Cadman et al. 2013). Thereby, granting equity-based compensation with a longer vesting period can encourage managers to shift their focus from short-term performance toward long-term value creation (e.g. Gopalan et al. 2014). Accordingly, we propose the following hypothesis in an alternative form.

H1: Firms with a high level of transient institutional ownership will have longer pay duration compared to firms with a low level of transient institutional ownership.

Institutional investors also play an important monitoring role in mitigating the agency problem between shareholders and managers. They influence the design of executive compensation by making overall CEO pay to be more closely linked to corporate performance (Hartzell and Starks 2003). However, not all institutional investors serve as active monitors. Previous literature documents that dedicated institutions independent from firm management have higher monitoring incentives than other institutions (Bushee 1998; David et al. 1998; Brickley et al. 1988; Chen et al. 2007; Ramalingegowda and Yu 2012). Dedicated institutions, as described above, have long-term investment horizon with concentrated investment portfolios (Bushee 1998). Independent institutions (also known as pressure-resistant institutions) such as public pension funds, foundations and mutual funds do not have direct business relationships with firms they invest in and, therefore, do not experience conflicts of interests (David et al. 1998; Brickley et al. 1988). Accordingly, independent institutions are found to promote long-term value of firms by improving corporate innovation (Kochhar and David 1996) and oppose management in voting on antitakeover amendments than other institutions (Brickley et al. 1988). Following previous studies such as Chen et al. (2007) and

Ramalingegowda and Yu (2012), we expect dedicated and independent institutional investors would provide active monitoring on firm management .

The impact of such long-term institutional investors on pay duration, however, can be mixed. Unlike transient institutions that have very short-term investment horizons, dedicated and independent institutions are likely to influence directly the design of executive compensation. Higher ownership of dedicated and independent institutions means a strong influence of these investors in board decisions, making firms to design executive contracts closely linking to long-term value maximization. Therefore, if monitoring by such institutional investors is used in combination with a longer-duration pay contract in mitigating the agency problems between shareholders and managers, the ownership of dedicated and independent institutions will be positively associated with pay duration.

However, providing managers with longer pay duration can be costly to firms. Risk-averse managers would prefer shorter vesting terms to avoid risks that may arise due to volatility of future stock prices (Cadman et al. 2013). Also, they might need to forfeit unvested equity holdings upon their voluntary resignation (Balsam and Miharjo 2007). To compensate such additional risks associated with longer pay duration, managers may ask for extra compensation, which will impose additional costs on their firms. However, monitoring by dedicated and independent institutional investors may prevent managers from making myopic decisions, mitigating firms' need to bear the additional costs associated with long pay duration. In this case, the ownership of dedicated and independent institutions will be negatively associated with pay duration. According to the two competing views, we present the second hypotheses regarding dedicated and independent institutional investors in a null form.

H2: There is no association between dedicated and independent institutional ownership and pay duration.

As discussed above, providing a longer-duration pay contract in response to short-termism incentives created by transient institutional investors can be costly. However, when effective

monitoring schemes by dedicated and independent institutions are in place, firms may use less costly alternatives that have the same effect as long pay duration (Gopalan et al. 2014). Accordingly, ownership held by dedicated and independent institutions can reduce the sensitivity of pay duration to transient institutional ownership. This leads to our third hypothesis as the following.

H3: The positive association between transient institutional ownership and pay duration, *as hypothesized in H1*, will be weaker for firms with a high level of ownership of dedicated and independent institutions than for other firms.

3. Data and descriptive statistics

3.1. Data

We collect executive compensation data for Russell 3000 firms from 2006 to 2011 using the Equilar database. Equilar database is not only comprehensive but also includes items that are not available from ExecuComp, such as the grant date, fair value and the vesting schedule of each equity compensation component. Such detailed equity vesting period data for executives from 2006 onwards is essential in following Gopalan et al. (2014) to calculate the pay duration of each executive. Financial data and stock price data are collected from Compustat and CRSP database where financial and utility industries are excluded from our analysis. Data regarding boards of directors are obtained from Corporate Library. We define transient investors, dedicated investors and quasi investors following Bushee (1998, 2001) and collect the ownership percentage of each investor type from Thomson-Reuters Institutional Holdings (13F) Database. For dedicated investors, we further separate them into independent and non-independent institutions based on Brickley et al. (1988) to account for the extent to which each institutional type is willing to engage in monitoring firm management. From the original 82,026 observations from Equilar our final sample size consists of 41,224 firm-year observations after excluding firms lacking data from either of the databases mentioned above.

3.2. Pay duration

Pay duration is calculated following Gopalan et al. (2014) as shown in equation (1) below. The formula for each executive's pay duration is a function of cash and non-cash payments, which include restricted stocks and stock options. If remuneration packages are more dependent on cash (non-cash) payments, then pay duration will have a low (high) value.

$$Pay\ Duration = \frac{(Salary + Bonus) \times 0 + \sum_{i=1}^{n1} Restricted_i \times t_i + \sum_{j=1}^{n2} Option_j \times t_j}{Salary + Bonus + \sum_{i=1}^{n1} Restricted_i + \sum_{j=1}^{n2} Option_j} \quad (1)$$

where *Salary* is the annual salary and *Bonus* the annual bonus in dollar value for all executives. *Restricted_i* is the fair value of restricted stock grant *i* with a vesting period *t_i* (measured in the number of years) at the grant date. *Option_j* is the fair value of stock option grant *j* with a vesting period *t_j* (measured in the number of years) at the grant date. *n1* (*n2*) is the total number of restricted stock grants (stock option grants) in a given year. In some cases the vesting schedules of securities are contingent on future performance. Following Gopalan et al. (2014) we make the following three assumptions. First, when the number of securities is fixed, we assume that this grant will vest together at once at the end of performance measurement period. Second, when a grant has a performance-based accelerating vesting schedule we assume that this grant will vest according to the initially specified vesting schedule. Third, when a grant is part of a long-term incentive plan in which the exact number of securities offered is determined by future performance, we assume that the number of securities offered is the target number of securities provided in Equilar and that the vesting begins after the end of the performance period.¹

3.3. Research models

¹ Further discussions on limitations of using an annual-based pay duration measure can be found in Cheng et al. (2016).

We use an industry-by-year fixed effect models, where the Fama-French 48 industry classification is used to capture the industry differences. To adjust for unobservable heterogeneity industry-by-year clustered standard errors are used when making statistical inferences.

Both transient (*TRAN*) and dedicated institutional ownership (*DED*) are included in our base regression model as shown in equation (2) below where *i* denotes the firm, *e* denotes the individual executive, and *t* for time.

$$\begin{aligned} \text{Pay Duration}_{i,e,t} = & \beta_0 + \beta_1 \text{TRAN}_{i,t-1} + \beta_2 \text{DED}_{i,t-1} + \beta_3 \log TA_{i,t} + \beta_4 \text{MTB}_{i,t} + \beta_5 \text{LTAsset}_{i,t} + \beta_6 \text{R\&D}_{i,t} + \\ & \beta_7 \text{LTDebt}_{i,t} + \beta_8 \text{Return}_{i,t} + \beta_9 \text{Volatility}_{i,t} + \beta_{10} \text{Spread}_{i,t} + \beta_{11} \text{Insider}_{i,t} + \\ & \beta_{12} \text{Board_Ind}_{i,t} + \beta_{13} \text{Board_Size}_{i,t-1} + \beta_{14} \text{CEO_Chair}_{i,t} + \beta_{15} \text{CEO dummy}_{i,t} + \\ & \text{Industr by year dummies} + \epsilon_{i,e,t} \end{aligned}$$

To further test H2, dedicated investors are split into two types as follows: dedicated and independent investors (*DID*) and dedicated and non-independent investors (*DND*). To address the potential causality issue between pay duration and institutional ownership, we use the ownership values at the start of each financial year. Also, to avoid the omitted variable problem among institutional ownership data we control for cross-sectional variations in institutional ownership following Gompers and Metrick (2001) and use the residual value of institutional ownership after controlling for instrumental variables in the regressions.²

Various firm characteristics are controlled by using a log of total assets (*logTA*), market to book ratio (*MTB*), long term assets defined as ratio of book value of property plant and equity plus goodwill over non-cash total assets (*LTAsset*), R&D to total assets (*R&D*), and long-term debts to total assets (*LTDebt*). Variables from the stock market data such as the previous year's stock return (*Return*) and stock volatility (*Volatility*) are included to control for prior stock performance where the previous year's average spread (*Spread*) is used to control for stock liquidity. To control for firms' corporate governance, variable such as insider ownership (*Insider*), board independence (*Board_Ind*),

² Variables such as market value, company age, dividend yield, stock price, S&P 500 index dummy are used as suggested in Gompers and Metrick (2001). The results are available in appendix.

board size (*Board_Size*), and CEO duality (*CEO_Chair*) dummy are included. A CEO dummy which has a value of one for a CEO is included since pay duration tends to differ for CEOs and non-CEO executives (Gopalan et al. 2014). In addition, dummy variables for year and the Fama-French 48 industry classification are included.

Further, to test H3, we add an interaction term between transient institutional ownership and dedicated institutional ownership to equation (2). For the interaction term, we use a dummy variable for dedicated institutional investors (*DED_dummy*) where the dummy variable has a value of one if dedicated institutional ownership is above the median value each year and zero otherwise. The additional regression model is presented below.

$$\begin{aligned} Pay\ Duration_{i,e,t} = & \beta_0 + \beta_1 TRAN_{i,t-1} + \beta_2 DED_{i,t-1} + \gamma_1 TRAN_{i,t-1} \times DED\ dummy + \\ & \beta_3 \log TA_{i,t} + \beta_4 MTB_{i,t} + \beta_5 LTAsset_{i,t} + \beta_6 R\&D_{i,t} + \beta_7 LTDebt_{i,t} + \beta_8 Return_{i,t} + \\ & \beta_9 Volatility_{i,t} + \beta_{10} Spread_{i,t} + \beta_{11} Insider_{i,t} + \beta_{12} Board_Ind_{i,t} + \beta_{13} Board_Size_{i,t-1} + \\ & \beta_{14} CEO_Chair_{i,t} + \beta_{15} CEO\ dummy_{i,t} + Industr\ by\ year\ dummies + \epsilon_{i,e,t} \end{aligned} \quad (3)$$

3.4. Descriptive statistics

Table 1 shows the descriptive statistics of key variables used in our study. To avoid any bias due to outliers all variables are winsorized at the 1% and 99% levels. The average pay duration for our sample is 1.23. The minimum value is 0 which indicates that the remuneration packages for some firms are fully based on cash compensation. The transient institutional investor group has a mean value of 18.57%. Dedicated institutional investors have a mean value of 8.70% which is about a half of the mean value of the transient institutional ownership. Within the dedicated institutional investor group, the majority of the ownership is held by dedicated independent institutions, who have an average of 8.12%. Dedicated non-independent institutions hold a small fraction of ownership compared to dedicated independent institutions, presenting a mean value of 0.51%. In panel B, we show how pay duration changes each year from 2006 to 2011. Except for 2009, pay duration has been increasing in value. When CEOs are separated from other executives, CEOs exhibit a higher level of pay duration in all years compared to the non-CEO group as reported in Gopalan et al. (2014). The

difference between the two groups is approximately 0.25 years and for all years the differences are statistically significant at the 1% level.

Table 2 shows the Pearson's correlation coefficients matrix. As anticipated in H1, pay duration has a positive correlation with transient institutional ownership (TRAN). In addition, DED and DID are also positively correlated with pay duration while the correlation with DND is not significant. The largest correlation coefficient with pay duration is total assets (logTA). Other control variables have the expected signs such as growth firms (higher MTB) are positively correlated to pay duration similar to findings of Cadman et al. (2013). For corporate governance variables, insider ownership decreases pay duration whereas a higher level of board independence and size increases pay duration.

4. Results

4.1. Transient institutional ownership and pay duration

The results for our baseline regression model in equation (2) are shown in table 3. The first column includes the transient institutional ownership (TRAN) and the dedicated institutional ownership (DED) while column (2) separates dedicated independent institutions (DID) from dedicated non-independent institutions (DND). The results confirm hypothesis 1 in that transient institutional ownership has a positive influence on pay duration. In column (1), the coefficient on TRAN is 0.3055 and statistically significant at the 1% level (t-stat = 4.29). This means an interquartile range change in transient institutional ownership will lead to a change in the mean value of pay duration by 3.4%. For column (2) the coefficient on TRAN is 0.3023 and still statistically significant at the 1% level (t-stat = 4.26). When DID and DND are used to further separate dedicated institutional investors, we find that the positive influence only exists for DID (coeff = 0.2573, t-stat = 2.78) while DND has a positive and insignificant coefficient. This means only dedicated independent investors positively influence pay duration. An interquartile range change in dedicated independent institutions leads to a change in the mean value of pay duration by 2.03%. The positive influence of dedicated independent institutions on pay duration rejects our null hypothesis H2. This result is in line with

previous findings by David et al. (1998) and Dikolli et al. (2009) in that long-term institutions affect managerial contracts by increasing long-term components of total pay such equity-based compensation.

The control variables show that larger firms (logTA), growth firms (MTB), firms with higher returns (Return), and R&D intensive firms (R&D) have longer pay duration whereas firms with higher long-term debts (LTDebt), and more liquidity (Spread) have shorter pay duration. The CEO dummy confirms that CEOs have a longer duration compared to the other executives by 0.25 years. Corporate governance variables further show that the higher level of ownership that executives hold, the stronger their monitoring incentives will be, shortening pay duration. We also find that firms with better board representation by independent outsiders have longer pay duration. This is consistent with findings by Ryan and Wiggins (2004) that independent directors have higher bargaining power over the CEOs, making directors to be paid more by equity-based compensation.³

Previous literature such as Gompers and Metrick (2001) suggests that institutional ownership variables are endogenous and an OLS estimation might be inconsistent. The endogeneity of the institutional ownership variables stem from two facts: 1) firm characteristics such as features of remuneration packages can attract a certain type of institutional investors and 2) unobservable variables may affect both the institutional investors' decision in selecting firms and pay duration. We note the first issue implies that transient institutional investors would be more attracted to firms with shorter pay duration. If this is the case we would expect pay duration and transient institutional ownership to be negatively correlated. This will lead to the opposite result to what we hypothesized and weaken our results. To further avoid the endogeneity problem we use lagged independent variables and conduct a two stage analysis where in the first stage all ownership variables are fitted by firm characteristics and the residuals for each institutional investor type is obtained. The results for

³ Overall results for control variables are consistent with those reported by Gopalan et al. (2014). In addition, untabulated results show that other corporate governance variables such as outside block ownership do not influence pay duration.

the first stage regression is in appendix. The residual values for the ownership variables are used in the second stage regression models in the remainder of the paper.⁴

Columns (3) and (4) of table 3 show the results when transient and dedicated institutional ownership variables are replaced with the residual values obtained from the first stage. Due to unavailability of some firm characteristics in the first stage, the sample size is decreased to 40,850 firm-year observations. The results are qualitatively the same with those obtained from columns (1) and (2) and confirm H1 that a high level of transient ownership increases pay duration. The coefficient of TRAN is 0.2971 and 0.2951 in column (3) and (4), respectively, and both are significant at the 1% level (t-stat = 3.68 and 3.67, respectively). The null hypothesis, H2, is again rejected as dedicated and independent institutional ownership is positively and significantly associated with pay duration. The coefficient of DID is 0.2714 and significant at the 1% level (t-stat=2.81) while that of DND is positive but insignificant.⁵

4.2. Moderating effect of dedicated and independent investors

In this section, we test the moderating effect of long-term institutions on the relationship between transient institutions and pay duration. Column (1) of table 4 presents the results with total dedicated institutional ownership. The value of the dummy for dedicated institutional ownership is set as 1 if the level of ownership is within the highest quartile group each year. Both TRAN and DED still have positive and statistically significant coefficients, confirming findings from table 3. The interaction term between TRAN and DED has a negative and statistically significant coefficient (coeff = -0.5655, t-stat = 3.04). The economic significance of the moderating effect is evident when compared to the coefficient of transient ownership. The moderating effect of dedicated institutions

⁴ When all the residual ownership variables are sorted by the residual of transient ownership and then grouped into quartiles, the mean of each quartile for residual long-term ownership and the three residual dedicated ownership variables (i.e., dedicated, independent, and non-independent) show no systematic pattern.

⁵ As our main findings are qualitatively unchanged, we present our results with the residual ownership variables for the rest of the paper to avoid any endogeneity concern.

offsets the positive influence of transient institutional ownership on pay duration as shown in the comparison test.

Further, column (2) separates dedicated and independent institutions (DID) from dedicated and non-independent institutions (DND). The interaction term of TRAN with DID is negative and statistically significant (coeff = -0.4203, t-stat = -2.21) whereas that with DND is negative but insignificant (coeff = -0.2761, t-stat = -1.56). The results suggest the moderating effect is originated only from dedicated and independent investors, supporting H3. The economic significance of the moderating effect of DID is similar to that of DED in that it can mute the influence of transient ownership on pay duration according to the comparison test. The overall results indicate that monitoring institutions, such as dedicated and independent, can effectively prohibit managers being pressured by short-term investors and taking myopic actions. However, we cannot find the same effect from dedicated and non-independent investors.⁶

5. Additional tests

We also run the following additional tests. First, we check the results by using a sub-sample with CEOs only. Then, we further test a number of issues related to the relationship between transient institutional investors and pay duration. Finally, we test how short-term and long-term firm performances are sensitive to the level of transient institutional ownership and whether pay duration affects such sensitivity.

5.1. Robustness tests

5.1.1. CEO sub-sample analysis.

⁶ The results for the moderating effect by dedicated institutions may be induced by the firms that exhibit a high level of dedicated institutional ownership with a low level of transient institutional ownership. However, table 2 shows that the correlation between TRAN and DED is positive and statistically insignificant. Furthermore, residual variables used in our analysis can mitigate such problem.

In table 5, a sub-sample of executives who are CEOs is used for a robustness check. For the sub-sample, the total number of observations is 7,844. Overall, the results are consistent with our main findings. In column (1), it is shown that the coefficient on the transient institutional ownership is significantly positive at the 5% level. Compared to that reported in table 3, the magnitude of the coefficient is more than doubled (coeff = 0.8104), indicating pay duration of CEO contracts is determined more sensitively to short-term incentives exerted by transient investors. Further, in columns (2) and (3), we find that dedicated institutions, especially dedicated and independent, still lengthen pay duration of CEO compensation while dedicated and non-independent institutions do not present significant results. The moderating effect of these institutions significantly reduces the effect of TRAN on pay duration. For example, dedicated and independent institutions can reduce 66.4% of the sensitivity of TRAN to pay duration. Note that for this sub-sample test, we include the tenure of each CEO, which is an important value in determining the optimal compensation structure for top managers. The result shows that CEO tenure is negatively related to pay duration. This finding is consistent with the literature such as Charles and Phan (1991) in that CEO tenure indicates her power over the board. A more powerful CEO is likely to influence the board to provide her a shorter duration pay contract. short Untabulated results including the CEO equity holdings, defined as the logarithmic dollar value of total equity holdings for the CEO, shows that equity holdings has a positive and statistically significant value. This result is in line with the risk aversion argument that managers with high wealth are likely to be less risk averse (Becker 2006).

5.1.2. Effects of liquidity

In this section, we investigate how pay duration is affected by the possibility of institutional investors' exiting the firm. As higher liquidity will make easier for institutional investors to leave the firm, managers would feel stronger pressure to cater to the institutional investors' needs. Previous studies document two governance mechanisms exerted by institutional investors: 1) they can directly intervene in firm management (engage in "voice") and 2) they can discipline underperforming managers by threatening to sell their shares (engage in "exit") (Edmans and Manso 2011; Edmans

2009; Admati and Pfleiderer 2009). In particular, the latter is a disciplinary device which can be used by non-controlling blockholders (Edmans 2009). According to the survey conducted by McCahery et al. (2016), nearly a half of the institutions surveyed responded that exit is an effective way to influence management in a firm with disappointing past performance. They find that such threat is most effective when exit can lead to selling by other investors for the same reason. Previous studies also argue that such “exit threat” will be more powerful when the market is highly liquid as elevated liquidity may allow large shareholders to leave the firm more easily (Edmans and Manso 2011; Edmans 2009; Admati and Pfleiderer 2009). The negative signaling effect of the departure of institutional investors could depress stock prices, damaging managers’ reputation. Also, this will harm managers’ personal wealth as their performance-based bonuses are often linked to share prices, which are adversely affected by a strong sell off. Transient institutional investors who have access to large investment funding can use similar threat to affect managers and, accordingly, short-termism induced by these institutions will likely be stronger when stock liquidity is high. In this case, however, firms will be proactive by changing the design of executive contracts, i.e., pay duration in our research setting, to promote long-term incentives of managers. Therefore, high liquidity in the stock market will increase the sensitivity of pay duration with regard to transient institutional ownership. While dedicated investors are also likely to use exit threats to discipline underperforming managers, they would not necessarily change pay duration when the liquidity is high. Therefore, we do not expect to see any impact of liquidity on the relationship between pay duration and dedicated institutional ownership.

Table 6 reports the results where the Amihud (2002)’s illiquidity measure (*Amihud*) is used as a proxy for the transaction costs that an investor would bear for a turnaround transaction. The *Amihud_dummy* variable which takes a value of one for the least illiquid quartile group each year is used for all interaction terms. The results for interaction terms with TRAN for both columns show statistically significant and positive coefficients (coeff = 0.5525, t-stat = 2.37 in column (1); coeff = 0.5515, t-stat = 2.40 in column (2)). That is, when the cross-sectional liquidity is relatively higher, i.e., the exit threat of transient investors is higher, pay duration of executive compensation becomes more sensitive to the aggregate amount of transient ownership. Pay duration of a firm with liquid stocks is

more than three times sensitive to the transient ownership compared to a firm with illiquid stocks where the sensitivity in the two columns increases from 0.2288 to 0.7813 and 0.2270 to 0.7785, which is a nearly 240% increase. For dedicated and independent institutional investors, the interaction terms with the Amihud dummy are insignificant in both columns. The statistically insignificant results, especially for the dedicated and independent institutional investors, confirms our conjecture that the sensitivity of pay duration for dedicated institutional ownerships is not different by stock liquidity in the equity market.

5.1.3. Further tests

The top quartile used for long-term institutional investor dummies may not equate to whether these investors hold significant enough shares to act as influential external monitors. We further investigate if the same results are for alternative cutoff points. In column (1) the top quintile is used as a cutoff point. The results do not change to the alternative definition of DID_dummy and DND_dummy. The moderating effect eliminates the sensitivity of transient ownership, consistent with H3 and as shown in table 4 while exhibiting higher level of statistical significance at the 1% level. Even if the top decile is used as a cut-off point the results remain the same (untabulated). Another alternative option is to use investors with block ownership for capturing dedicated investors. While dedicated investors tend to act as active monitors, their effectiveness will be more evident if they hold sufficient amount of shares. In column (2) we reproduce DID and DND residual values by using the aggregated ownership for only the top five block holders (based on raw amounts) in each firm for the two types of dedicated institutions. The residual values of the aggregated top block holders' ownership are obtained by re-running the first stage regression. The dummy variables are set as 1 for the top quartiles for DID and DND residuals. The results confirm that the interaction term for transient ownership and DID still has a positive coefficient with statistical significance at the 1% level when block holders are only considered. When large block holders are used, another notable part is that DND interaction term becomes statistically significant which suggests that even non-independent institutional investors are likely to be active monitors when they are heavily invested in the firm as a

large block holder. In column (3) and (4) of table 7, we change our focus to alternative fixed effects models or clustering variables for adjusting standard errors. In column (3) the Fama-French 48 industry classification is used to control for unobserved heterogeneity. In column (4) the SIC 3-digit codes are used instead of the Fama-French 48 industry classification for the industry-by-year fixed effects model, which was the main model used by Gopalan et al. (2014). The results echo our findings in table 4.

Furthermore, following Dikolli et al. (2009), we use the sum of quasi and dedicated investors to calculate long-term institutional ownership (LT) instead of separating dedicated independent institutions and dedicated non-independent institutions. The results are presented in Table 8 where columns (1) and (2) are for the whole sample and columns (3) and (4) are for the CEO sub-sample. Both TRAN and LT are still positive and significant, consistent with our main findings and those of Dikolli et al. (2009). However, the interaction between TRAN and LT is not significant, indicating the moderating effect on the relationship between transient ownership and pay duration is only found with dedicated and independent institutional ownership.

5.2 Firm performance

In this section we aim to test the effectiveness of pay duration on lessening the pressure of transient institutions on managerial decision. In column (1) of table 9 short-term and long-term firm performances are investigated by using one-year ahead and four-year ahead ROA. The rationale to use four years ahead performance to proxy for long-term performance is due to the fact that most of the equity grants are fully vested within four years' time (Gopalan et al. 2014).⁷ For the test, a pay duration dummy (PD_dummy) is constructed where the value of the dummy is set as one if the firm's

⁷ Gopalan et al. (2014) show that around 85% of restricted stocks and options have a vesting period of less than or equal to 4 years where the majority of the vesting period lies in either 3 years or 4 years. This suggests that executives would have an investment horizon which focuses on maximizing their equity values within 4 years.

pay duration value exceeds the cross sectional median each year.⁸ We first generate a panel data which includes both short term and long term performances. When the dependent variable is the long term ROA a long-term performance dummy (yr4_dummy) takes a value of one. This dummy variables is used to create interaction variables with the main explanatory variables. When first focusing on the effect of pay duration on performance, we find that longer pay duration decreases the short-term performance (coeff = -0.0051, t-stat = -1.93) but increases the long-term performance (coeff = 0.0030, t-stat = 2.62), indicating that equity compensation with longer-term vesting periods does motivate managers to focus on long-term performance of the firm. The results for transient ownership shows that short term firm performance is sensitive to transient ownership (i.e., TRAN, coeff = 0.0990, t-stat = 2.42) and larger transient ownership is likely to induce stronger short term performance. However, the influence from transient ownership is moderated when pay durations are set at a high level (i.e., TRAN*PD_dummy, coeff = -0.1189, t-stat = -2.30). The result confirms that longer pay duration can mitigate any undesirable pressure from transient investors and prevent myopic managerial behavior. In the long term, the sensitivity of firm performance towards transient institutional investors has a negative coefficients (i.e., TRAN*4yr_dummy, coeff = -0.0852, t-stat = -3.04), indicating that higher level of transient institutional ownership weakens future firm performance. More importantly, the interaction term with pay duration moderates the negative impact that transient institutional investors have on the 4 years ahead ROA value (i.e., TRAN*PD_dummy*4yr_dummy, coeff = 0.0752, t-stat = 2.00). In sum, we find some supporting evidence that pay duration is effective in moderating the negative impact of high levels of transient ownership of firm performance in the short term. Column (2) repeats the same analysis but use the average of three years ahead and four years ahead ROA as a robustness test. We confirm that alternative specification of future long term performance does not alter our main finding.

6. Conclusion

⁸ The analysis in this section is based on those firms that have both one-year and four-year ahead firm performance measures.

This study examines how different types of institutional investors affect pay duration. Based on 41,224 firm-year observations for Russell 3000 firms from 2006 to 2011 we find that the presence of a high level of transient institutional ownership leads firms to lengthen pay duration. Dedicated and independent institutional investors as active monitors are found to lengthen pay duration, indicating a long duration pay contract is used to mitigate the agency problems along with monitoring. Furthermore we find the influence of transient institutions on pay duration is reduced when the ownership level of dedicated and independent institutional investors is high. These findings are robust to alternative measures for the level of dedicated institutional ownership. In addition, the sub-sample tests with CEOs confirm our main findings and the impact of transient institutional investors is found to be stronger for firms with highly liquid stocks, indicating pressure from transient institutional investors can be higher when the stock market is more liquid. Finally, further tests comparing short-term and long-term performance indicate that a higher level of transient institutional ownership leads to weaker future firm performance. Furthermore, providing long pay duration can alleviate the negative impact of transient institutional investors on future performance.

Overall results indicate firms actively choose the vesting schedules of executive compensation components in response to implicit and explicit incentives that managers face. Lengthening pay duration may reduce the agency problem induced by the mismatch of horizon incentives among shareholders and managers. Our results indeed confirm that lengthening pay duration encourages managers to make less sacrifice of future firm performance although there is short-termism pressure from transient institutional investors. These findings should be of interest to shareholders, boards of directors and remuneration committees when determining their firms' executive compensation policies. Also our study provides a further understanding of the influence exerted by shareholder investment horizon on managerial contract design. Although we assume investment horizon of institutional investors, i.e. short-term and long-term, remains unchanged throughout our research period, their investment horizon may be affected by external factors (e.g.,

IPOs reported in Cadman and Sunder (2014)).⁹ A future study could further investigate dynamic market factors or corporate events affecting horizon incentives of managers and shareholders.

⁹ Bolton et al. (2006) argue that existing shareholders become more short-term focused in a speculative stock market. We select the 12 months prior to the global financial crisis as the period when the market is speculative and repeat our tests to check the impact of the changed market factor. However, untabulated results indicate influence of diverse investor types on pay duration do not change during the selected period.

Appendix. First stage Fama-MacBath annual cross-sectional regression

Gompers and Metrick (2001) uses 10 variables to explain the cross sectional variation of institutional ownership across firms. The variables proxy for the prudence, liquidity, and historical returns for each individual firms. The variables used are the log values of Book-to-Market (logBM), Market cap. (logMVq), age of firm in months (logagem), dividend yield (logyield), price at end of previous year (logPRCCM), dummy equal to 1 if included in sp500 index (sp_dum), variance of monthly returns (logstd), previous three months' gross return (mom3), previous nine month gross return ending three months prior to the current year (mom9), and the log value of turnover measured by the previous quarter's traded volume divided by shares outstanding. The first stage results, which are used to generate the residual values for the five institutional investor types, used in our study is shown below.

	Variable	Intercept	logBM	logMVq	logPRCCM	logagem	logstd	logturnover	logyield	mom3	mom9	sp_dum
TRAN	Mean	-0.0916	0.0087	0.0131	0.0131	-0.0098	0.0159	0.0405	-0.2600	-0.0005	0.0135	-0.0651
	P-value	<.0001	0.0111	<.0001	<.0001	0.0021	0.0028	<.0001	<.0001	0.9583	0.0007	<.0001
LT	Mean	-0.2775	0.0557	0.0524	0.0488	0.0332	0.0017	0.0629	-0.8807	-0.0978	-0.0543	-0.1130
	P-value	<.0001	<.0001	<.0001	<.0001	0.0042	0.8874	<.0001	<.0001	0.0031	<.0001	<.0001
DED	Mean	0.0384	0.0061	0.0113	0.0070	-0.0043	0.0159	0.0014	-0.1984	-0.0124	-0.0099	-0.0211
	P-value	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	0.1268	<.0001	<.0001	<.0001	<.0001
DID	Mean	0.0308	0.0055	0.0104	0.0055	-0.0047	0.0129	0.0032	-0.1944	-0.0108	-0.0091	-0.0202
	P-value	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	0.0007	<.0001	<.0001	<.0001	<.0001
DND	Mean	0.0076	0.0006	0.0009	0.0015	0.0004	0.0030	-0.0018	-0.0040	-0.0016	-0.0007	-0.0009
	P-value	<.0001	0.1124	0.0006	0.0005	0.0006	<.0001	<.0001	0.4324	0.0235	0.3038	0.1566

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Table 1. Descriptive statistics

Table 1 Panel A presents the descriptive statistics for the variables used in this study. All variables are winsorized at the 1% level. Panel B presents the value of pay duration for each fiscal year and also the comparison of pay duration among CEOs with other executives. Ownership types are transient ownership (TRAN), dedicated institutional ownership (DED), dedicated and independent institutional ownership (DID) and dedicated and non-independent institutional ownership (DND). The control variables are log of total assets (logTA), market to book ratio (MTB), ratio of book value of property plant and equity plus goodwill over non-cash total assets (LTAsset), R&D to total assets (R&D), and long-term debts to total assets (LTDebt). Variables from the stock market data such as the previous year's stock return (Return) and stock volatility (Volatility) are included to control for prior stock performance where the previous year's average spread (Spread) is used to control for stock liquidity. To control for firms' corporate governance, variable such as insider ownership (Insider), board independence ratio (Board_Ind), board size (Board_Size),

Panel A. Descriptive statistics for key variables

Variable	Mean	STD	Q1	Median	Q3
Pay duration	1.2311	0.8252	0.6124	1.3103	1.8016
<i>Ownership by institutional investor type</i>					
TRAN	0.1857	0.0998	0.1115	0.1714	0.2473
DED	0.0870	0.0771	0.0236	0.0705	0.1344
DID	0.0812	0.0731	0.0202	0.0638	0.1280
DND	0.0051	0.0200	0.0000	0.0000	0.0005
<i>Control Variables</i>					
logTA	7.1958	1.5939	6.0208	7.0505	8.2139
MTB	1.9548	1.2111	1.1898	1.5545	2.2714
LTAsset	0.4447	0.2225	0.2785	0.4369	0.6002
R&D	0.0420	0.0839	0.0000	0.0030	0.0462
Volatility	0.4818	0.2392	0.3106	0.4216	0.5925
LTDebt	0.2134	0.2056	0.0212	0.1799	0.3219
Return	0.1606	0.5552	-0.1772	0.085	0.3757
Spread (%)	0.1194	0.1514	0.0474	0.0729	0.1237
Insider (%)	13.0509	18.6822	2.4300	5.3300	14.0900
Board_Ind (%)	70.8675	16.1161	62.5000	75.0000	83.3333
Board_Size (%)	8.7903	2.0425	7.0000	9.0000	10.0000

Panel B. Pay duration by year and by executive type

Year	Full		CEO		Ex. CEO	
	Obs	Pay duration	Obs	Pay duration	Obs	Pay duration
2006	5408	1.1871	1049	1.3757	4359	1.1417
2007	7134	1.2108	1384	1.4034	5750	1.1644
2008	7288	1.2180	1450	1.4169	5838	1.1686
2009	7136	1.1352	1435	1.3253	5701	1.0874
2010	7713	1.2695	1540	1.4596	6173	1.2221
2011	6796	1.3583	1377	1.5537	5419	1.3086

Panel C. Pay duration across Fama-French 48 industry classification

	Mean	STD		Mean	STD
Agriculture	1.0857	1.0077	Automobiles and Trucks	0.9852	0.7185
Food Products	1.1420	0.9306	Aircraft	1.3398	0.8518
Candy & Soda	1.2644	1.1977	Shipbuilding, Railroad Equipment	1.4452	0.7440
Beer & Liquor	1.6645	0.8029	Defense	0.8446	0.7884
Tobacco Products	1.4209	0.9856	Precious Metals	0.8018	0.5548
Recreation	1.1424	0.7299	Non-Metallic & Industrial Metal Mining	1.1861	0.8698
Entertainment	1.1052	0.8875	Coal	1.4056	0.7213
Printing and Publishing	0.9889	0.6480	Petroleum and Natural Gas	1.3545	0.8172
Consumer Goods	1.2996	0.8351	Communication	1.1752	0.8727
Apparel	1.0187	0.8324	Personal Services	1.1099	0.7823
Healthcare	1.2347	0.8465	Business Services	1.2719	0.8384
Medical Equipment	1.2740	0.7949	Computers	1.3341	0.8096
Pharmaceutical Products	1.2902	0.7598	Electronic Equipment	1.3338	0.7702
Chemicals	1.2557	0.8132	Measuring and Control Equipment	1.3173	0.8349
Rubber and Plastic Products	1.0685	0.6886	Business Supplies	1.3123	0.8521
Textiles	0.8924	0.7468	Shipping Containers	1.5424	0.7809
Construction Materials	1.0499	0.8621	Transportation	1.1989	0.8663
Construction	1.0635	0.8383	Wholesale	1.1992	0.7876
Steel Works Etc	1.2796	0.8170	Retail	1.1475	0.8659
Fabricated Products	0.7889	0.7247	Restaurants, Hotels, Motels	1.2011	0.7446
Machinery	1.3224	0.7904	Other	1.1418	0.7804
Electrical Equipment	1.2612	0.7659			
	Mean	STD	Median		
Across industries	1.1991	0.1843	1.20109		

Table 2. Pearson Correlation coefficient matrix

* denotes statistical significance at the 5% level

	Pay duration	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
TRAN (1)	0.07*	1															
DED (2)	0.07*	0.01	1														
DID (3)	0.07*	0.03*	0.95*	1													
DND (4)	0.02	-0.05*	0.29*	-0.01	1												
logTA (5)	0.37*	-0.03*	0.12*	0.11*	0.04*	1											
MTB (6)	0.05*	0.02*	-0.01	-0.01	0.02*	-0.26*	1										
LTAsset (7)	0.06*	-0.05*	0.04*	0.04*	-0.01	0.29*	-0.24*	1									
R&D (8)	0.02	0.03*	0.03*	0.03*	0.01	-0.33*	0.39*	-0.35*	1								
LTDebt (9)	0.02*	0.02*	0.15*	0.14*	0.06*	0.27*	-0.18*	0.29*	-0.17*	1							
CEO_dum (10)	0.12*	-0.00	-0.01	-0.01	-0.00	-0.01	0.00	-0.01	0.00	-0.01	1						
Return (11)	0.05*	0.19*	-0.02*	-0.02	-0.01	-0.03*	0.17*	-0.03*	0.01	-0.05*	-0.01	1					
Volatility (12)	-0.12*	0.11*	-0.05*	-0.05*	-0.04*	-0.33*	0.06*	-0.10*	0.18*	0.01	0.01	0.34*	1				
Spread (13)	-0.21*	-0.16*	-0.13*	-0.13*	-0.01	-0.43*	0.10*	-0.10*	0.14*	-0.03*	0.01	0.26*	0.46*	1			
Insider (14)	-0.24*	-0.18*	-0.06*	-0.05*	-0.03*	-0.21*	0.00	-0.06*	-0.05*	0.04*	0.01	-0.01	0.07*	0.21*	1		
Board_Ind(15)	0.15*	0.10*	0.04*	0.03*	0.04*	0.17*	-0.01	-0.01	0.01	-0.05*	-0.01	-0.06*	-0.19*	-0.17*	-0.38*	1	
Board_Size(16)	0.23*	-0.09*	0.04*	0.03*	0.05*	0.59*	-0.11*	0.14*	-0.15*	0.18*	-0.01	-0.03*	-0.24*	-0.21*	-0.12*	0.12*	1
Ceo_Chair (17)	0.05*	-0.02*	0.01	0.00	0.04*	0.17*	-0.04*	0.08*	-0.13*	0.03*	-0.01	-0.01	0.10*	-0.06*	-0.01	0.13*	0.03*

Table 3. Transient investor ownership and pay duration

This table presents the results for our baseline model which tests the relationship between transient investor ownership and pay duration. Transient (TRAN) and dedicated institutional ownership (DED) are included. Dedicated institutional ownership is further separated into two types of investors according to their independence from the firm, namely, dedicated and independent institutional ownership (DID) and dedicated and non-independent ownership (DND). The control variables are log of total assets (logTA), market to book ratio (MTB), ratio of book value of property plant and equity plus goodwill over non-cash total assets (LTAsset), R&D to total assets (R&D), and long-term debts to total assets (LTDebt). Variables from the stock market data such as the previous year's stock return (Return) and stock volatility (Volatility) are included to control for prior stock performance where the previous year's average spread (Spread) is used to control for stock liquidity. To control for firms' corporate governance, variable such as insider ownership (Insider), board independence ratio (Board_Ind), board size (Board_Size), and CEO's board chair duality dummy (CEO_Chair) are included. A CEO dummy is included which has a value of one for a CEO. All p-values are two-sided values and ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively.

VARIABLES	(1) Raw ownership	(2) Raw ownership	(3) Res ownership	(4) Res ownership
TRAN	0.3055*** (4.29)	0.3023*** (4.26)	0.2971*** (3.68)	0.2951*** (3.67)
DED	0.2258** (2.47)		0.2418** (2.52)	
DID		0.2573*** (2.78)		0.2714*** (2.81)
DND		-0.0461 (-0.14)		0.0402 (0.12)
logTA	0.1873*** (25.87)	0.1872*** (25.87)	0.1944*** (26.21)	0.1944*** (26.20)
MTB	0.0653*** (8.79)	0.0655*** (8.79)	0.0667*** (8.90)	0.0670*** (8.90)
LTAsset	0.0270 (0.64)	0.0264 (0.63)	0.0242 (0.56)	0.0238 (0.55)
R&D	0.7343*** (6.63)	0.7317*** (6.64)	0.7573*** (6.61)	0.7559*** (6.61)
LTDebt	-0.1217*** (-3.17)	-0.1213*** (-3.15)	-0.1165*** (-2.99)	-0.1167*** (-3.00)
CEO_dum	0.2549*** (29.27)	0.2549*** (29.26)	0.2533*** (29.28)	0.2534*** (29.27)
Return	0.0563*** (4.04)	0.0562*** (4.03)	0.0616*** (4.52)	0.0615*** (4.50)
Volatility	-0.1639*** (-3.45)	-0.1648*** (-3.47)	-0.1196** (-2.50)	-0.1196** (-2.51)
Spread	-0.2178*** (-3.91)	-0.2158*** (-3.87)	-0.2709*** (-4.96)	-0.2698*** (-4.94)
Insider	-0.0045*** (-11.09)	-0.0045*** (-11.08)	-0.0046*** (-11.41)	-0.0046*** (-11.40)
Board_Ind	0.0034*** (6.61)	0.0034*** (6.64)	0.0033*** (6.37)	0.0033*** (6.39)
Board_Size	0.0085* (1.81)	0.0086* (1.83)	0.0059 (1.23)	0.0059 (1.24)
Ceo_chair	-0.0097	-0.0095	-0.0107	-0.0106

Constant	(-0.74) -0.5449*** (-7.61)	(-0.72) -0.5461*** (-7.62)	(-0.82) -0.5044*** (-7.36)	(-0.80) -0.5062*** (-7.37)
Observations	41,224	41,224	40,850	40,850
Adjusted R2	0.237	0.237	0.239	0.239
F	205.7	196.7	211.7	202.6

Table 4. Monitoring role of dedicated and independent institutions

This table tests for the monitoring effect of dedicated institution. The dummy variable for dedicated institutional investors (DED_dummy) is set as one if the long-term ownership is above the top quartile value for that year and zero if otherwise. Cross-sectional variation in institutional ownership following Gompers and Metrick (2001) and the residual value of institutional ownership after controlling for instrumental variables are used. The residual variables are transient investors (TRAN), dedicated investors (DED), dedicated and independent investors (DID), and dedicated and non-independent investors (DND). All p-values are two-sided values and ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively.

VARIABLES	(1) Pay duration	(2) Pay duration
TRAN	0.4337*** (4.89)	0.4791*** (4.79)
DED	0.2372** (2.48)	
TRAN *DED_dummy	-0.5655*** (-3.04)	
DID		0.2754*** (2.87)
TRAN *DID_dummy		-0.4203** (-2.21)
DND		0.0037 (0.01)
TRAN *DND_dummy		-0.2761 (-1.56)
logTA	0.1953*** (26.83)	0.1944*** (26.36)
MTB	0.0675*** (8.95)	0.0671*** (8.92)
LTAsset	0.0226 (0.52)	0.0220 (0.50)
R&D	0.7421*** (6.60)	0.7471*** (6.55)
LTDebt	-0.1151*** (-2.96)	-0.1159*** (-2.99)
CEO_dum	0.2533*** (29.28)	0.2533*** (29.29)
Return	0.0606*** (4.45)	0.0615*** (4.47)
Volatility	-0.1175** (-2.47)	-0.1205** (-2.52)
Spread	-0.2664*** (-4.95)	-0.2686*** (-5.00)
Insider	-0.0046*** (-11.43)	-0.0046*** (-11.40)
Board_Ind	0.0033*** (6.34)	0.0033*** (6.36)
Board_Size	0.0056 (1.18)	0.0059 (1.23)
Ceo_Chair	-0.0111	-0.0111

Constant	(-0.85) -0.5084*** (-7.49)	(-0.84) -0.5032*** (-7.38)
Observations	40,850	40,850
Adjusted R2	0.240	0.240
F-stats	208.5	190.6
Comparison test (p-value)		
TRAN + TRAN*DED_dummy=0	-0.1318 (0.4283)	
TRAN + TRAN*DID_dummy=0		0.0588 (0.7485)

Table 5. CEO sub-sample

In this table a sub-sample of executives who are either the CEO of a firm is used to test the hypotheses. For the sub-sample the total number of observations are 7,844. All p-values are two-sided values and ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively.

VARIABLES	(1) Pay duration	(2) Pay duration
TRAN	0.8104** (2.49)	0.6403*** (3.21)
DED	0.3109** (2.38)	
TRAN*DED_dummy	-0.3788* (-1.92)	
DID		0.3513*** (2.66)
TRAN*DID_dummy		-0.4249** (-2.05)
DND		0.0470 (0.10)
TRAN*DND_dummy		-0.3587 (-1.48)
CEO_Tenure	-0.0134*** (-8.79)	-0.0135*** (-9.07)
logTA	0.1750*** (16.81)	0.1745*** (16.70)
MTB	0.0442*** (4.37)	0.0442*** (4.38)
LTAsset	-0.0272 (-0.48)	-0.0281 (-0.49)
R&D	0.8433*** (4.91)	0.8472*** (4.93)
LTDebt	-0.1473** (-2.26)	-0.1527** (-2.34)
Return	-0.0171 (-0.31)	-0.0165 (-0.30)
Volatility	0.0758*** (4.42)	0.0768*** (4.49)
Spread	-0.3208*** (-3.96)	-0.3196*** (-3.94)
Insider	-0.0069*** (-10.87)	-0.0068*** (-10.85)
Board_Ind	0.0048*** (6.32)	0.0048*** (6.32)
Board_Size	0.0118* (1.92)	0.0119* (1.93)
CEO_Chair	0.0351* (1.74)	0.0359* (1.77)
Constant	-0.0854 (-0.77)	-0.0774 (-0.70)
Observations	7,844	7,844
Adjusted R2	0.244	0.245

F-stats	172.8	152.7
Comparison test (p-value)		
TRAN + TRAN*DED_dummy=0	0.4316 (0.0082)	
TRAN + TRAN*DID_dummy=0		0.2154 (0.2855)

Table 6. The effect of liquidity

In this table two measures of liquidity is used: one is the average relative spread from the previous year and the other is Amihud's illiquidity measure (Amihud, 2002). The liquidity dummy is set as one if the spread and Amihud's measure is below the lowest quartile value each year which is representative of the more liquid firms. All p-values are two-sided values and ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively.

VARIABLES	(1) Pay duration	(2) Pay duration
TRAN	0.2288** (2.25)	0.2270** (2.24)
Amihud	-1.9301*** (-5.49)	-1.9261*** (-5.47)
TRAN*Amihud_dummy	0.5525** (2.37)	0.5515** (2.40)
DED	0.3017*** (2.62)	
DED*Amihud_dummy	-0.1284 (-0.54)	
DID		0.3002*** (2.60)
DID*Amihud_dummy		-0.0195 (-0.08)
DND		0.2121 (0.58)
DND*Amihud_dummy		0.0547 (0.07)
logTA	0.1912*** (24.82)	0.1914*** (24.88)
MTB	0.0734*** (8.32)	0.0735*** (8.30)
LTAsset	0.0272 (0.57)	0.0270 (0.57)
R&D	0.9773*** (5.94)	0.9787*** (5.95)
LTDebt	-0.0418 (-0.98)	-0.0421 (-0.99)
CEO_dum	0.2541*** (26.97)	0.2541*** (26.96)
Return	0.0480*** (3.07)	0.0479*** (3.05)
Volatility	-0.1981*** (-3.85)	-0.1973*** (-3.84)
Insider	-0.0046*** (-9.56)	-0.0046*** (-9.52)
Board_Ind	0.0035*** (6.23)	0.0035*** (6.23)
Board_Size	0.0061 (1.24)	0.0062 (1.25)
CEO_Chair	-0.0150 (-1.07)	-0.0149 (-1.07)

Constant	-0.5035*** (-6.40)	-0.5057*** (-6.42)
Observations	36,384	36,384
Adjusted R2	0.238	0.238
F-stats	180.1	164.8

Table 7. Additional Robustness tests

Columns (1) and (2) changes the dedicated investor dummies using a different cut-off point. The cut-off point for column (1) is the top 20% point for each investor type and calculated on an annual basis. The second column is based on the aggregated ownership of the top 5 largest shareholders for each investor type using the raw ownership values. The residual values of the newly aggregated values are used to determine the dummy variables. Columns (3) and (4) use different variables to cluster the panel data while controlling for industry-by-year fixed effects. The third column uses the Fama-French 48 industry classification for clustering while the fourth column uses the SIC 3 digit codes for the industry-by-year fixed effects and clustering as done in Gopalan et al. (2014). All p-values are two-sided values and ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively.

VARIABLES	(1) Top quintile	(2) Top 5	(3) FF 48 industries	(4) SIC 3 digit
TRAN	0.4374*** (4.77)	0.5534*** (5.50)	0.4791*** (4.47)	0.5561*** (4.49)
DID	0.2690*** (2.80)	0.2693*** (2.89)	0.2754** (2.04)	0.2808** (2.11)
TRAN*DID_dummy	-0.5825*** (-2.81)	-0.5824*** (-3.50)	-0.4203** (-2.35)	-0.4275** (-2.25)
DND	-0.0338 (-0.10)	-0.2157 (-0.65)	0.0037 (0.01)	0.3077 (0.56)
TRAN*DND_dummy	-0.1622 (-0.74)	-0.4574** (-2.45)	-0.2761 (-1.40)	-0.2891 (-1.46)
Control Variables Industry-by-year	Included Controlled	Included Controlled	Included Controlled	Included Controlled
Observations	40,850	40,850	40,850	41,067
Adjusted R2	0.240	0.240	0.240	0.292
F	150.9	163.9	494.3	122.6
Comparison test (p-value)				
TRAN + TRAN*DID_dummy=0	-0.1451 (0.4681)	-0.0290 (0.8500)	0.0588 (0.7231)	0.1286 (0.4705)

Table 8. Robustness test with long-term institutional ownership

Long-term institutional ownership (LT) is calculated as the sum of quasi and dedicated institutional ownership.
 All p-values are two-sided values and ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively.

VARIABLES	(1) Pay duration Whole	(2) Pay duration Whole	(3) Pay duration CEO	(4) Pay duration CEO
TRAN	0.2677*** (3.38)	0.3312*** (3.68)	0.2151* (1.72)	0.3058** (2.07)
LT	0.3044*** (7.08)	0.3024*** (6.96)	0.4111*** (7.08)	0.4086*** (7.00)
TRAN*LT_dummy		-0.2949 (-1.32)		-0.2017 (-0.93)
CEO_tenure			-0.0132*** (-8.57)	-0.0132*** (-8.57)
logTA	0.2061*** (28.44)	0.2064*** (28.46)	0.1899*** (18.38)	0.1901*** (18.37)
MTB	0.0701*** (9.25)	0.0706*** (9.33)	0.0482*** (4.72)	0.0485*** (4.73)
LTAsset	0.0131 (0.31)	0.0114 (0.27)	-0.0391 (-0.69)	-0.0405 (-0.72)
R&D	0.8010*** (7.10)	0.7962*** (7.06)	0.9101*** (5.35)	0.9080*** (5.34)
LTDebt	-0.1280*** (-3.26)	-0.1275*** (-3.25)	-0.0355 (-0.63)	-0.0341 (-0.61)
CEO_dum	0.2535*** (29.23)	0.2535*** (29.24)		
Return	0.0650*** (4.76)	0.0645*** (4.68)	0.0809*** (4.66)	0.0804*** (4.61)
Volatility	-0.0731 (-1.52)	-0.0733 (-1.52)	-0.0881 (-1.34)	-0.0879 (-1.34)
Spread	-0.2394*** (-4.48)	-0.2367*** (-4.44)	-0.2800*** (-3.51)	-0.2782*** (-3.48)
Insider	-0.0042*** (-10.75)	-0.0042*** (-10.69)	-0.0064*** (-10.31)	-0.0064*** (-10.23)
Board_Ind	0.0030*** (6.06)	0.0030*** (6.08)	0.0045*** (6.07)	0.0045*** (6.09)
Board_Size	0.0075 (1.55)	0.0076 (1.57)	0.0145** (2.31)	0.0145** (2.31)
Ceo_Chair	-0.0105 (-0.81)	-0.0105 (-0.80)	0.0337* (1.68)	0.0338* (1.69)
Constant	-0.6267*** (-9.11)	-0.6305*** (-9.11)	-0.2475** (-2.16)	-0.2482** (-2.16)
Observations	40,850	40,850	7,844	7,844
Adjusted R2	0.242	0.242	0.249	0.249
F-stats	215.5	206.6	173.4	163.9
Comparison test (p-value)				
TRAN + TRAN*LT_dummy=0		0.0363 (0.8535)		0.1041 (0.5732)

Table 9. Firm performance and pay duration

In this table short-term and long-term firm performance are used. The one year ahead represents short-term and four years or the average of three years and for years ahead represents the long-term for ROA in models (1) and (2) . A pay duration dummy is used where the value of the dummy is set as 1 when the firm's pay duration value exceeds the cross sectional median value. All p-values are two-sided values and ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively.

VARIABLES	(1) ROA	(2) Avg. ROA
PD_dummy	-0.0051* (-1.93)	-0.0048* (-1.85)
TRAN	0.0990** (2.42)	0.0972** (2.40)
TRAN*PD_dummy	-0.1189** (-2.30)	-0.1194** (-2.30)
PD_dummy*yr4_dummy	0.0030*** (2.62)	0.0022** (2.21)
TRAN*yr4_dummy	-0.0852*** (-3.04)	-0.0807*** (-3.25)
TRAN*PD_dummy*yr4_dummy	0.0752** (2.00)	0.0836** (2.53)
DED	-0.0504 (-1.47)	-0.0495 (-1.44)
logTA	0.0139*** (3.62)	0.0137*** (3.59)
MTB	0.0278*** (4.69)	0.0281*** (4.69)
LTAsset	0.0074 (0.41)	0.0082 (0.45)
R&D	0.0000*** (3.15)	0.0000*** (3.20)
LTDebt	-0.0000*** (-4.59)	-0.0000*** (-4.52)
Return	0.0280*** (4.62)	0.0300*** (5.31)
Volatility	-0.1942*** (-6.11)	-0.1947*** (-6.09)
Spread	-0.0556 (-1.24)	-0.0597 (-1.36)
Insider	0.0001 (0.38)	0.0001 (0.38)
Board_Ind	-0.0002 (-0.93)	-0.0002 (-0.85)
Board_Size	-0.0023 (-1.37)	-0.0024 (-1.39)
CEO_Chair	0.0062 (1.20)	0.0067 (1.28)
Constant	0.1005** (2.43)	0.1009** (2.43)
Observations	51,236	51,223
Adjusted R2	0.243	0.255
F-stats	19.85	17.53

Comparison test (p-value)		
TRAN + TRAN*PD_dummy =0	-0.0199	-0.0241
	(0.6893)	(0.6563)
TRAN*yr4_dummy + TRAN*PD_dummy*yr4_dummy =0	-0.0100	-0.0029
	(0.7877)	(0.9239)
