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## Institutional Investors' Ownership Stability and Their Investee Firms' Equity Mispricing

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## **1. Introduction**

Equities are said to be “mispriced” when deviations exist between a firm’s stock price and its intrinsic value (the intrinsic value is defined as the present value of the future cash flows generated by the firm on a per share basis). The adverse consequences of equity mispricing for investors and corporations are well documented in the literature (Chirinko and Schaller, 2001; Baker et al., 2003; Shleifer and Vishny, 2003; Rhodes-Kropf and Viswanathan, 2004; Rhodes-Kropf et al., 2005; Polk and Sapienza, 2009; and, Campello and Graham, 2013).

The causes of equity mispricing are diverse and include investor sentiment (Baker and Wurgler, 2006) and investors' behavioral biases (Barberis et al., 1998; and, Daniel et al., 1998), among others. This study adds to the literature by considering how institutional investors invest on the basis of firm mispricing. Institutional investors are the dominant group of investors having raised their ownership of US-listed corporations from 7-8% in 1950 to about 67% by 2010 (Blume and Keim, 2012), and it is essential to assess how their growing influence is contributing to equity pricing. Several dimensions of institutional investors are examined in this paper, including their equity ownership proportion and stability, as well as their investment horizon.

Institutional investors can influence their investee firms via two channels. The first channel is through direct monitoring following acquisitions of large blocks of shares. Indirect monitoring is the second channel. In this case, institutional investors can punish or reward firms by their trading behavior (Parrino et al., 2003) — selling a firm’s stock puts downward pressure on the stock price, and thus disciplines management through loss of firm value. As a result, we would expect a direct link between institutional ownership and the actions taken at their investee firms, which would reflect on the firm's equity pricing.

Bushee (1998, 2001) and Bushee and Noe (2000) classify institutional investors into the following groups, i.e., dedicated, transient, and quasi-indexers investors. “Dedicated” institutional investors tend to adopt a long-term investment horizon by holding large, stable holdings in a relatively small number of firms. Conversely, “Transient” investors trade aggressively (i.e., their equity portfolios exhibit high levels of turnover), their portfolios are more diversified, and they are focused on short-term returns. “Quasi-indexer” institutions hold large, diversified portfolios and trade very infrequently; they tend to be passive investors pursuing primarily a buy-and-hold investment strategy. Given their different investment strategies, we examine the extent of equity mispricing in their portfolios. For example, if dedicated institutional investors favor a relationship approach to investing, we test whether they are associated with less mispriced stocks. Since transient investors are actively seeking short-term returns, we test whether they are associated with more mispriced stocks.

We use two methods to assess equity mispricing. The first one follows Rhodes-Kropf et al. (2005), a widely used method in the literature on equity mispricing (for instance, Lin et al. 2010; Bonaimé et al., 2014). Under this model, mispricing (denoted by EXVRK) represents the difference between a firm’s market and fundamental values. The second method to compute equity mispricing, i.e., EXVIA, i.e., the natural log of the ratio between a firm’s capital and its imputed value. The sample includes all U.S. publicly listed firms held by institutional investors from 1981 to 2012. There are 82,037 firm-year observations based on 11,461 firms. Our analysis reveals several interesting findings. First, the higher the proportion of equity ownership by institutional investors in a firm, the lower the extent of equity mispricing. Second, volatility in institutional equity ownership is positively related to investee firm's measures of equity mispricing. Third, institutional ownership by dedicated and quasi-indexers are inversely

associated with investee firm's measures of mispricing. Lastly, ownership by transient institutional investors is associated with higher investee firm's equity mispricing.

We make several contributions to the literature. First, we contribute to the factors that explain equity mispricing. Second, we augment the literature on the effects of institutional ownership by considering both the volatility in their shareholdings and the variability in the types of institutional investors. Third, we contribute to the stock market efficiency literature by documenting the linkage between equity mispricing and institutional ownership stability.

To the best of our knowledge, we are the first to document the effects of institutional ownership stability on equity mispricing. Our study contributes to understanding the forces of institutional ownership on equity mispricing and renders the stock market more efficient. We posit our study as an extension to Lin et al. (2010) in the sense that the actions and involvement of institutional investors help to bridge the gap between artificial and true values of equity. The benefits to institutional investors are that by contributing to making stock prices more accurate, they preclude themselves from being caught by a bubble. Many institutional investors manage others' money and therefore are tasked to invest their investors' money responsibly and prudently.

The remainder of the paper is structured as follows: The following section presents a brief review of the related literature. Data and methods are presented in Sections 3 and 4, respectively. Results are presented and discussed in Section 5; and, the final section concludes the paper.

## **2. Literature Review**

Studies that consider the effects of institutional ownership on equity mispricing (for example, Sias and Starks (1997) on the price adjustment process; Bartov et al. (2000) on mispricing following earnings announcement; Collins et al. (2003) on mispricing and accruals) focus primarily on the proportion of the share ownership by institutional investors rather than the stability and persistence of institutional investors' equity ownership.

Certain studies document the superior trading ability of institutional investors relative to individual investors and their contributions to stock pricing efficiency. Cohen et al. (2002) compare and contrast institutional investors' trades (in response to cash flow-related news) relative to those of private individuals. They find that institutions buy (sell) shares from (to) individual investors following positive (negative) cash flow news. Conversely, share price increases (decreases) that are not accompanied by positive (negative) cash flow news prompt institutional investors to sell (buy) the shares to (from) the individuals. Institutional investors trade stocks with individuals rather than among themselves since, as a class of investors, they share the same information; and their actions cause a stock price to align more closely to its intrinsic value.

Barber and Odean (2008) compares and contrasts the investment patterns of institutional investors relative to individual investors. Their findings suggest that the trading behaviors of the two differ and institutional investors, on average, hold more substantial ownership than individual investors, and they are more sophisticated in acquiring and processing investment-related information. The authors find that individuals display attention-based buying behavior when stocks are in the news, while institutional investors do not exhibit such behavior. Individual investors' propensity to trade on attention-grabbing news leads to higher volatility in stock prices. Conversely, institutional investors trade less on such news, and therefore their

trading pattern counteracts the volatility induced by the individual investors' trades. This conjecture is backed up by Boehmer and Kelley (2009), who show that stocks with higher institutional ownership are priced more efficiently.

Prior literature demonstrates that the presence of institutional investors plays a significant role in the overall future pricing of securities. Gompers and Metrick (2001) assert that there is a positive relation between institutional ownership and future stock returns. They find that "large" institutional investors doubled their share ownership between 1980 and 1996, and show that their involvement accounts for approximately half the increase in the stock price of large firms. They define "large" institutional investors as a category including all managers with at least \$100 million under management. Yan and Zhang (2009) later show that the findings in Gompers and Metrick (2001) are driven by short-term institutions, i.e., institutions that trade more actively. Given these findings, we believe that differentiating between institutional investors based on their investment horizons will shed further light on the group's impact on equity pricing.

Chakrabarty et al.'s (2017) study of daily institutional trades documents that many such trades by short-term institutional investors, in particular, tend to lose money. They find that over 23% of round-trip trades held for less than three months lose an average of 3.91% in value. The negative returns do not appear to be due to loss-cutting based on the arrival of new information. Their results suggest that institutional investors that trade often and are characterized by higher variability in their shareholdings would be associated with more significant stock mispricing.

We observe that the findings that institutional investors' trades push equity prices closer to their intrinsic values are based predominantly on treating institutional investors as a homogenous class. Accounting for the heterogeneity that exists among institutional investors

would cause the findings to differ. Institutional investors tend to vary on various characteristics. For a start, there are both long-term and short-term oriented investors. Long-term investors are more inclined to work with management to create value through closer monitoring (Chen et al., 2007). Short-term investors are less likely to perform such tasks, i.e., engaging with investee firm's management to create wealth in the long run (Yan and Zhang, 2009). Consequently, the way institutional investors' select their equity portfolios differ based on their investment objectives and horizons.

To ascertain the effects of different types of institutional investors on equity mispricing, we use the classification of Bushee (1998, 2001) and Bushee and Noe (2000) and group institutional investors into either dedicated, transient, or quasi-indexer. Transient investors trade aggressively in search of short-term profits. Simultaneously, dedicated and quasi-indexing institutions have a longer investment horizon and do not actively transact shares for short-term gains. The analysis of the effects of institutional investors on equity mispricing per this classification is essential. Ke and Petroni (2004) describe how the actions of transient institutional investors' ability to predict a break in a string of consecutive earnings increases can improve stock pricing. Cremers and Pareek (2011) find that both momentum returns and subsequent returns reversal are stronger for stocks with greater proportions of short-term institutional investors. Derrien et al. (2013) find that longer investor horizons attenuate the effect of stock mispricing on corporate policies.

Besides the heterogeneity among institutional investors, another factor affecting firm valuation is the volatility in their equity shareholdings. For example, Elyasiani and Jia (2008) show that institutional ownership stability positively affects banks' performance. Elyasiani et al. (2010) document that institutional ownership stability leads to lower debt costs. Jafarinejad et al.

(2015) find that the presence of long-term stable institutional investors enhances the value of diversified firms. Sakaki et al. (2017) show that firms held by more stable institutional investors experience lower real activities manipulations. Jory et al. (2017) find a positive association between institutional ownership persistence and dividend payout. While the literature on institutional ownership stability is still nascent, the evidence so far suggests that the stability of institutional shareholdings is an economically important factor in the study of firm valuation. This paper extends the literature by studying how institutional investors' ownership stability affects equity mispricing at investee firms.

### **3. Data Source and Sample Selection**

Information on institutional ownership is obtained from the Thomson-Reuters Institutional Holdings (13F) database (formerly known as CDA spectrum). The shareholdings data come from Form 13F filed by institutional managers—with \$100 million or more in assets under management—with the U.S. Securities and Exchange Commission (SEC). We obtained annual financial and accounting data to estimate mispricing variables from the Compustat Database. To classify institutional investors based on their investment horizon, we obtained data on trading frequency from Professor Bushee website<sup>1</sup> and trading volume from the University of Chicago's Center for Research in Security Prices (CRSP) database.

The sample includes all U.S. publicly listed firms held by institutional investors from 1981 to 2012. There are 82,037 firm-year observations based on 11,461 firms, as shown in panel A of Table 1. Panel B of Table 1 presents the sample distribution by industry based on the Fama

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<sup>1</sup> Available from Brian Bushee's website, <http://acct3.wharton.upenn.edu/faculty/bushee/>. Data accessed on 12.01.2015.



and French 12-sector industry classification. The main industries are: Business Equipment (22.24%), Others<sup>2</sup> (16.02%), Manufacturing (15.96%), Wholesale, Retail, and Some Services (12.78%). The least represented industry is Chemical (2.99%).

[INSERT TABLE 1 ABOUT HERE]

## 4. Methodology

### 4.1. Measures of Institutional Investors' Ownership

To measure institutional ownership volatility, we follow Elyasiani et al. (2010) and use the variable ( $IOV_i$ ), which is the average standard deviation of institutional shareholding proportions across all investors  $j$  in firm  $i$  over a five-year period including the sample year and the four years preceding (i.e., 20 quarters).

$$IOV_i = \frac{\sum_{j=1}^{J_i} \text{Std}(p_{i,t}^j)}{J_i} \quad (1)$$

where  $p_{i,t}^j$  is the proportion of firm  $i$  held by investor  $j$  in quarter  $t$  ( $t = 1, 2, \dots, 20$ ), and  $J_i$  is the number of institutional owners in firm  $i$ . The higher the ownership volatility, the lower is the institutional ownership stability and vice versa. Therefore, lower  $IOV$  is associated with higher institutional ownership stability.

To control for the effect of institutional ownership on equity mispricing, we consider the aggregate ownership proportion (following Elyasiani et al., 2010), which is computed over a five-year period (i.e., 20 quarters) as follows:

$$PROP_i = \left( \sum_{t=1}^{20} \sum_{j=1}^{J_i} p_{i,t}^j \right) / 20 \quad (2)$$

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<sup>2</sup> Mines, Construction, Building Maintenance, Transportation, Hotels, Bus Services, Entertainment

where  $p_{i,t}^j$  is the proportion of firm  $i$  held by investor  $j$  in quarter  $t$  ( $t = 1, 2, \dots, 20$ ).

## 4.2. Measures of Equity Mispricing

Two methods are used to compute equity mispricing. The first one follows Rhodes-Kropf et al. (2005), a method that is widely used in the literature on equity mispricing (for instance, Lin et al. 2010; Bonaimé et al., 2014). Under this model, mispricing (denoted by  $EXVRK$ ) represents the difference between a firm's market and fundamental values. The fundamental value is obtained by estimating equation (3) for every industry and every year as follows:

$$\ln(MV_{it}) = \beta_{0jt} + \beta_{1jt} \ln(BV_{it}) + \beta_{2jt} \ln[\text{abs}(NI_{it})] + \beta_{3jt} I_{(<0)} \ln[\text{abs}(NI_{it})] + \beta_{4jt} LEV_{it} + \varepsilon_{it} \quad (3)$$

where  $MV_{it}$  is the market value of equity;  $BV_{it}$  is the book value of equity;  $NI_{it}$  is net income;  $I_{(<0)}$  is an indicator variable that equals one if the firm reports a net loss and zero otherwise; and  $LEV_{it}$  is the firm leverage; abs represents absolute values and ln represents the natural logarithm. All variables are measured at the end of the fiscal year. We estimate this regression for each year and industry<sup>3</sup> and we use the residuals ( $\varepsilon_{it}$ ) from these regressions as the first proxy for measuring equity mispricing ( $EXVRK$ ).

The second method to compute equity mispricing,  $EXVIA$  (Lin et al. 2010), is the natural log of the ratio between a firm's capital and its imputed value, and it is computed as follows:

$$EXVIA_{it} = \ln \left[ \frac{CPTL_{it}}{ICPTL_{it}} \right], \quad (4)$$

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<sup>3</sup> Industry is defined based on the Fama and French 12-sector industry classification.

where  $CPTL_{it}$  is total capital, measured as the market value of equity plus book value of debt, and  $ICPTL_{it}$  is the imputed value derived as the product of firm size (market value of common equity) and the median capital-to-size ratio in the firm's industry.<sup>4</sup>

### 4.3. Regression Analysis

We run the following ordinary least squares (OLS) regression to examine the impact of institutional ownership volatility (IOV) on equity mispricing (EXVRK and EXVIA in separate regressions):

$$EXVRK_{i,t+1} \text{ (EXVIA}_{i,t+1}) = \alpha_0 + \beta_1 IOV_{i,t} + \beta_2 PROP_{i,t} + \beta_3 LN\_SALE_{i,t} + \beta_4 LEV_{i,t} + \beta_5 LN\_AGE_{i,t} + \beta_6 ROA_{i,t} + \beta_7 DY_{i,t} + YEAR_t + INDUSTRY_i + \varepsilon_{i,t} \quad (5)$$

where  $i$  and  $t$  indicate firm and year, respectively.  $EXVRK$  and  $EXVIA$  are two different proxies for equity mispricing as explained in equations (3) and (4), respectively. Our main independent variables of interest are:  $IOV$ , i.e., the average standard deviation of shareholding proportions across all institutional owners, and  $PROP$ , i.e., the aggregate institutional shareholding proportions. To account for other factors affecting equity mispricing, equation (5) includes the following control variables: firm size ( $LN\_SALE_t$ ). Following Sheikh (2012) firm size is measured as the natural logarithm of total sales. Leverage ( $LEV_t$ ) is the ratio of book value of debt (i.e., the sum of long-term debt and debt in current liabilities) to total assets. Firm age ( $LN\_AGE_t$ ) is the natural logarithm of one plus the number of years the firm is listed on Compustat. Profitability ( $ROA_t$ ) is the ratio of operating income before depreciation-to-total assets. Dividend yield ( $DY_t$ ) is computed as the ratio of dividend to the firm's market value. All variables are measured at the end of year  $t$ .  $YEAR$  and  $INDUSTRY$  are dummy variables to

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<sup>4</sup> Industry is defined based on the Fama and French 48-sector industry classification.

control for the effect of unobserved economic variables and industry-specific effects, respectively. The standard errors are clustered by firms.

## 5. Results

### 5.1. Descriptive Statistics of Sample and Correlations

Table 2 provides the sample descriptive statistics. Panel A of Table 2 contains statistics on the mispricing variables. The mean values of EXVRK and EXVIA are 0.518 and 0.329, respectively. Our computed values are comparable to the values reported in Lin et. al, 2010 (i.e., 0.24 and 0.33, respectively). Panel B presents statistics on the institutional ownership variables. The mean value of institutional ownership proportion (*PROP*) is 23.6%, while the mean values of institutional ownership volatility (*IOV*) is 0.7%. The mean values of the equity ownership of Dedicated (*DED*), Quasi-indexers (*QIX*), and Transient (*TRA*) institutional investors are 4.8%, 22.1% and 8.6%, respectively. The descriptive statistics of the control variables used in the multiple regressions are presented in Panel C. There is significant variation among the sample firms in terms of sales (*LN\_SALE*), leverage (*LEV*), return on assets (*ROA*), age of the firm (*LN\_AGE*), and dividend yield (*DY*). Their inclusion assists in controlling for their influences on mispricing.

[INSERT TABLE 2 ABOUT HERE]

Table 3 presents the Pearson correlation coefficients between pairs of variables. We observe a significant negative correlation between institutional ownership proportions (*PROP*) and the mispricing variables (*EXVRK* and *EXVIA*). The negative correlations of -0.0718 and -0.0616 between *PROP* and each of *EXVRK* and *EXVIA*, respectively, suggest that higher institutional ownership proportion (*PROP*) is linked with lower equity mispricing. Consistent

with the beneficial role of institutional investors' stable presence at firms, the relationship between institutional ownership volatility (*IOV*) and the mispricing variables (*EXVRK* (0.0236) and *EXVIA* (0.0694)) is significantly positive. This outcome suggests that higher institutional ownership volatility (*IOV*) is associated with increased equity mispricing. We also find a significant positive correlation between the two proxies of mispricing, i.e. *EXVRK* and *EXVIA* (the correlation coefficient is 0.2859).

[INSERT TABLE 3 ABOUT HERE]

## 5.2. Univariate Analysis

Table 4 reports the mean and median of the mispricing variables (i.e., *EXVRK* and *EXVIA*) by quartiles of the institutional ownership variables (*IOV* in Panel A and *PROP* in Panel B). We conduct both a *t*-test and Wilcoxon test to investigate whether there are significant differences in the mispricing variables between the quartiles with high and low institutional ownership variables.

Panel A of Table 4 shows the mean and median mispricing for firms with the lowest (Q1) and highest (Q4) level of *IOV*. Firms with the highest institutional ownership volatility (*IOV* in Quartile 4) exhibit greater mispricing than firms in the bottom quartile (i.e., Quartile 1). The differences in the mean and median values of *IOV* between the bottom and top quartiles are negative and statistically significant at the 1% level which further validates our earlier findings.

Panel B of Table 4 shows the mean and median mispricing for firms with the lowest (Q1) and highest (Q4) levels of *PROP*, which represents the proportion of equity held by institutional investors. Firms with the highest level of *PROP* (i.e., Quartile 4) exhibit less mispricing than firms in Quartile 1 with the lowest values of *PROP*. The differences in the mean and median

values of the mispricing variables between the bottom and top quartiles are negative and statistically significant at the 1% level. Thus, Table 4 findings suggest that high institutional ownership (i.e., *PROP*) and low volatility in their shareholdings (proxied by *IOV*) are associated with less mispricing (i.e., *EXVRK* and *EXVIA*).

[INSERT TABLE 4 ABOUT HERE]

To disentangle the effects of institutional ownership from the volatility in institutional shareholdings, we partition the sample into five quintiles using *PROP* (i.e., the variable measuring institutional ownership proportion). Each quintile is then broken down into five sub-quintiles based on ownership volatility (i.e., *IOV*). Thus, we end up with a 5×5 matrix. We calculate the mean values of *EXVRK* and *EXVIA* for each element of the matrix and present the findings in Table 5, Panels A and B respectively.

In panel A of Table 5, as we move vertically from top to bottom, the institutional ownership proportion is constant but the institutional ownership volatility increases (higher *IOV* means lower institutional ownership stability). The portfolio with the highest *IOV* has higher equity mispricing (measured by *EXVRK*) than the portfolio with the lowest value. T-tests reported in the last column indicate that this difference is statistically significant. Furthermore, as we move horizontally from left to right, the institutional ownership volatility remains unchanged but the aggregate proportion increases. As ownership proportion increases, the mean values of the equity mispricing variables decrease. Panel B uses *EXVIA* as the mispricing variables and the findings are essentially the same, i.e., higher *IOVs* are associated with higher mispricing and lower *PROPs* are associated with higher mispricing.

[INSERT TABLE 5 ABOUT HERE]

Overall, the univariate results suggest that there is a negative and significant association between institutional ownership stability and equity mispricing. Indeed, even when the institutional ownership proportion is fixed, higher institutional ownership stability is associated with lower equity mispricing and vice versa. Furthermore, we document a negative and significant relationship between institutional ownership proportion and equity mispricing. Our findings also suggest that the presence of institutional investors and those that trade their stocks less frequently are linked with stocks that exhibit less mispricing. The following sections test these associations in a multivariate setup.

### **5.3. Institutional Ownership Volatility Results**

Table 6 reports OLS regression results from regressing the equity mispricing variables of *EXVRK* and *EXVIA* on institutional ownership volatility (*IOV*) and ownership proportion (*PROP*) alongside control variables. The results of regression models (1) and (2) show that the coefficient of institutional ownership volatility (*IOV*) is positive and statistically significant at the 1% level with *EXVRK* in Model 1 and *EXVIA* in Model 2. Consistently, higher institutional ownership volatility (which equates to lower stability in institutional stock ownership) is associated with higher equity mispricing. Conversely, there is a negative and significant association between institutional ownership proportion (*PROP*) and both equity mispricing variables of *EXVRK* and *EXVIA*. Thus, lower equity mispricing is associated with higher institutional ownership.

[INSERT TABLE 6 ABOUT HERE]

Table 7 reports the results of firm fixed-effect regressions, which capture the impact of time-invariant omitted firm specifications. Consistent with the OLS results from Table 6, *IOV*

and *PROP* are positively and negatively related to the mispricing variables, respectively. Overall, the regression results are consistent with the hypothesis that stability in institutional ownership and low institutional ownership are positively associated with investee firm's equity mispricing.

[INSERT TABLE 7 ABOUT HERE]

#### **5.4. Institutional Investors' Horizon Results**

As discussed earlier, institutional investors as a group are quite heterogeneous and, therefore, this section examines how different types of institutional investors impact investee firms' equity mispricing since their motivations to trade shares differ. To capture the heterogeneity amongst institutional investors, we adopt Bushee (1998, 2001) and Bushee and Noe (2000) categorization. Specifically, we classify institutional investors into three groups based on their investment horizon as follows: Dedicated, Quasi-indexers, and Transient, and consider their relationship to equity mispricing separately.

We hypothesize that since the investment horizons of dedicated and quasi-indexers investors tend to be long-term, they will be associated with less mispriced stocks. Conversely, the short-term nature of transient institutional investors would do little to alleviate the investee firm's mispricing. We augment equation (5) by adding the following three independent variables: *DED*, *QIX*, and *TRA*; which represent the proportion of the investee firms held by Dedicated, Quasi-indexers, and Transient institutional investors, respectively. We present the results of the OLS regressions in Table 8 and those of the fixed-effect regressions in Table 9.

Consistent with our hypothesis, the proportion of shares held by *DED* and *QIX* is inversely related to *EXVRK* and *EXVIA*, i.e., the more shares held by these investors, the lower is the mispricing in the equity of the investee firms. To validate the effects of investment horizon



on equity mispricing, the coefficient of *TRA* is positively related to both *EXVRK* and *EXVIA*, i.e., short-term institutional investors are associated with more mispriced stocks. Accounting for fixed effects, the results stay qualitatively the same in Table 9.

[INSERT TABLES 8 & 9 ABOUT HERE]

The findings from Tables 8 and Table 9 are consistent with the hypothesis that the strength of the relationship between institutional investors and equity mispricing depends on the characteristics of institutional investors. That is, the equity of firms held by Dedicated and Quasi-indexers institutional investors (long-term) is less mispriced than the equity held by Transient investors (short-term).

### **5.5. Three-stage least squares regression**

To account for potential endogeneity concerns, we run simultaneous-equation regressions of equity mispricing and institutional ownership using the technique of three-stage least-squares (3SLS) method following Elyasiani et al. (2010) and Sakaki & Jory (2019) at the firm-level. The control variables for *IOV* are firm size (*LN\_SALE*), shares outstanding (*LN\_SHARES*), and trading volume (*TURNOVER*). To explore the direction of the effect between institutional ownership stability and equity mispricing, we use their lead values by one year when they are used as outcome variables. Table 10 reports the results of our 3SLS estimations.

In the *EXVRK* regression results, the coefficient estimates of *IOV* reported in column (1) of Table 10 is positive and statistically significant at the 1 percent level, suggesting that institutional ownership volatility leads to higher equity mispricing. The coefficient estimates of the *EXVRK* reported in column (2) is not statistically significant, suggesting that equity mispricing may not be a consideration for institutional ownership to continue their stock holding with the

firms. When we use *EXVIA* as our alternative dependent variable, we document similar results as reported in columns (3) and (4). Put it differently, it is not the mispriced stocks that attracts the institutional investors and encourages them to continue their ownership, rather institutional ownership stability influences equity mispricing.

[INSERT TABLE 10 ABOUT HERE]

### **5.6. Alternative measure of mispricing and decade wise regressions**

Table 11 presents the findings of the fixed-effect regressions based on alternative measures of equity mispricing using the residual income model (Ohlson, 1995). The dependent variable is *EXVRI* which is the absolute value of the natural log of the ratio between the stock price and its intrinsic value from Ohlson's (1995) residual income value approach.  $EXVRI = \text{Ln}[\text{Price} / I(V)]$ , where *Price* is the stock price at the end of June of each year from CRSP, and *I(V)* is intrinsic value using the residual income model (Ohlson, 1995) and median values of analysts' forecasts issued in June, as in Frankel and Lee (1998).

[INSERT TABLE 11 ABOUT HERE]

The findings stay the same as before, i.e., *IOV* is positively and significantly related to mispricing while *PROP* is negatively and statistically associated with mispricing. The equity shareholdings of dedicated (*DED*) and quasi-indexers (*QIS*) are inversely associated with mispricing, while those of transient institutional investors (*TRA*) are positively related to mispricing. Thus, stability in institutional ownership, the proportion of shares held by institutional investors, and institutional investors that exhibit a long-term focus on investments at

their investor firms individually contribute to rendering the investor firm's equity more correctly priced.

We break the sample by decades and present our findings in Table 12. The findings on PROP representing the proportion of the firm equity held by institutional investors are more stable across time. The coefficient of PROP in the regressions of equity mispricing of EXVRK is negative and statistically significant in Panels A and D of Table 12.

[INSERT TABLE 12 ABOUT HERE]

## **6. Conclusion**

We study the association between institutional ownership and the stability of their equity ownership to determine if and to what extent these characteristics impact the extent to which the equity of their investee firms is mispriced. This investigation is important in understanding equity mispricing because institutional investors have been shown to be a heterogeneous group, i.e., they have differing investment horizons and the extent to which they seek to influence firm performance differs. Our findings suggest that the stability and proportion of institutional investors' equity ownership are significantly related to equity mispricing at investee firms. Specifically, the higher the proportion of shares held by institutional investors and the more stable is their shareholdings (i.e., the lower the volatility in their shareholdings), the less mispriced is the stock. Additionally, the association depends on institutional investors' investment objectives, characteristics, and investment horizons. For instance, while the shares held by long-term oriented institutional investors (i.e., dedicated investors and quasi-indexers) are less mispriced, those held by short-term institutional investors (i.e., transient investors) are more mispriced.

**Table 1: Sample distribution**

**Panel A. Sample distribution by year**

Year	N	%	CUM	Year	N	%	CUM
1981	1,467	1.79	1.79	1998	3,398	4.14	50.69
1982	1,475	1.8	3.59	1999	3,129	3.81	54.5
1983	1,722	2.1	5.69	2000	3,142	3.83	58.33
1984	1,848	2.25	7.94	2001	3,095	3.77	62.11
1985	1,840	2.24	10.18	2002	3,047	3.71	65.82
1986	1,982	2.42	12.6	2003	2,941	3.58	69.41
1987	2,117	2.58	15.18	2004	2,838	3.46	72.87
1988	2,186	2.66	17.84	2005	3,020	3.68	76.55
1989	2,057	2.51	20.35	2006	3,042	3.71	80.26
1990	2,124	2.59	22.94	2007	3,010	3.67	83.92
1991	2,154	2.63	25.56	2008	2,940	3.58	87.51
1992	2,340	2.85	28.42	2009	2,791	3.4	90.91
1993	2,514	3.06	31.48	2010	2,794	3.41	94.32
1994	2,796	3.41	34.89	2011	2,782	3.39	97.71
1995	2,931	3.57	38.46	2012	1,881	2.29	100
1996	3,255	3.97	42.43				
1997	3,379	4.12	46.55	<b>Total</b>	<b>82,037</b>	<b>100</b>	

**Panel B: Sample distribution by Fama and French 12-sector industry classification**

Industry	N	%	CUM
Business Equipment	18,247	22.24	22.24
Manufacturing	13,092	15.96	38.20
Wholesale, Retail, and Some Services	10,483	12.78	50.98
Healthcare, Medical Equipment, and Drugs	8,864	10.80	61.78
Consumer Non-durables	5,911	7.21	68.99
Energy	4,399	5.36	74.35
Consumer durables	2,899	3.53	77.88
Telephone and Television Transmission	2,540	3.10	80.98
Chemicals	2,449	2.99	83.97
Others	13,153	16.03	100
<b>Total</b>	<b>82,037</b>	<b>100</b>	

This table provides a description of the sample. Panel A presents sample distribution by year. Panel B presents the sample distribution by industry based on the Fama and French 12-sector industry classification. N represents the number of firm-year observations.

**Table 2 - Descriptive statistics of the sample**

**Panel A. Mispricing variables**

Variable	N	25%	Median	Mean	75%	Std.Dev.	Min	Max
EXVRK	82,037	0.182	0.391	0.518	0.711	0.468	0.000	7.447
EXVIA	82,037	0.096	0.211	0.329	0.410	0.391	0.000	9.071

**Panel B. Institutional ownership variables**

Variable	N	25%	Median	Mean	75%	Std.Dev.	Min	Max
DED (%)	82,037	0.000	0.017	0.048	0.070	0.073	0.000	0.989
IOV (%)	82,037	0.002	0.005	0.007	0.009	0.009	0.000	0.458
PROP (%)	82,037	0.060	0.164	0.236	0.360	0.219	0.000	0.999
QIX (%)	82,037	0.056	0.160	0.221	0.347	0.198	0.000	0.998
TRA (%)	82,037	0.008	0.048	0.086	0.131	0.100	0.000	0.957

**Panel C. Control variables**

Variable	N	25%	Median	Mean	75%	Std.Dev.	Min	Max
LN_SALE	82,037	3.870	5.221	5.279	6.708	2.210	-6.908	13.054
LEV	82,037	0.294	0.470	0.485	0.630	0.387	0.003	74.934
ROA	82,037	0.053	0.119	0.077	0.177	0.538	-134.238	1.984
LN_AGE	82,037	1.792	2.485	2.374	2.996	0.794	0.693	3.807
DY	82,037	0.000	0.000	0.013	0.014	0.072	-0.011	12.799

This table shows descriptive statistics of the sample. *EXVRK* is the absolute value of the firm-specific mispricing component of the difference between market value and fundamental value based on model III of Rhodes-Kropf et al. (2005). *EXVIA* is the absolute figure of the excess value computed as the natural log of the ratio between a firm's capital and its imputed value. *PROP* is the average aggregate institutional shareholding proportion across a five-year period. *IOV* is calculated as the average standard deviation of shareholding proportions across all the institutional owners over a five-year period. *DED*, *QIX* and *TRA* represent the proportion of the investee firms that are held by dedicated, quasi-indexers and transient institutional investors, respectively. *LN\_SALE* is measured as the natural logarithm of total sales. *LEV* is measured as book value of debt (sum of long-term debt and debt in current liabilities) divided by total assets. *ROA* is defined as operating income before depreciation divided by total assets. *LN\_AGE* is measured by the natural logarithm of one plus the number of years the firm is listed on Compustat. *DY* is computed as the ratio of dividend to the firm's market value.

**Table 3: Correlations**

	EXVRK (1)	EXVIA (2)	PROP (3)	IOV (4)	LN_SALE (5)	LEV (6)	ROA (7)	LN_AGE (8)	DY (9)
(1)	1								
(2)	0.2859*	1							
(3)	-0.0718*	-0.0616*	1						
(4)	0.0236*	0.0694*	0.1328*	1					
(5)	-0.1461*	-0.2536*	0.5566*	-0.1481*	1				
(6)	0.1062*	0.2958*	0.0394*	0.0055	0.1669*	1			
(7)	-0.0841*	-0.0143*	0.0578*	-0.0150*	0.1998*	-0.2227*	1		
(8)	-0.1201*	0.0170*	0.2573*	-0.0858*	0.4019*	0.0681*	0.0794*	1	
(9)	0.0071*	0.0499*	0.0042	-0.0108*	0.0643*	0.0351*	0.0180*	0.0499*	1

This table reports the correlations among variables used in this study. The column headings are defined as follows:

- (1) EXVRK is the absolute value of the firm-specific mispricing component of the difference between market value and fundamental value based on model III of Rhodes–Kropf et al. (2005)
- (2) EXVIA is the absolute figure of the excess value computed as the natural log of the ratio between a firm’s capital and its imputed value
- (3) PROP is the average aggregate institutional shareholding proportion across a five-year period
- (4) IOV is calculated as the average standard deviation of shareholding proportions across all the institutional owners over a five-year period
- (5) LN\_SALE is the natural logarithm of total sales
- (6) LEV is the book value of debt (sum of long-term debt and debt in current liabilities) divided by total assets
- (7) ROA is operating income before depreciation divided by total assets
- (8) LN\_AGE is measured by the natural logarithm of one plus the number of years the firm is listed on Compustat
- (9) DY is the ratio of total dividend divided by the firm’s market value

\* represents statistical significance at the 10% level

**Table 4: Mispricing and Institutional Ownership****Panel A: Mispricing by IOV**

Variable	Q1 (Low IOV)		Q2		Q3		Q4 (High IOV)		Mean Diff	Median Diff	t-test	w-test
	Mean	Median	Mean	Median	Mean	Median	Mean	Median				
EXVRK	0.524	0.386	0.508	0.380	0.509	0.391	0.535	0.414	-0.011	-0.028	-2.25**	-5.84***
EXVIA	0.310	0.210	0.304	0.204	0.321	0.204	0.385	0.232	-0.074	-0.021	-18.37***	-10.81***

**Panel B: Mispricing by PROP**

Variable	Q1 (Low PROP)		Q2		Q3		Q4 (High PROP)		Mean Diff	Median Diff	t-test	w-test
	Mean	Median	Mean	Median	Mean	Median	Mean	Median				
EXVRK	0.579	0.440	0.521	0.397	0.503	0.385	0.474	0.356	-0.105	0.223	22.52***	18.37***
EXVIA	0.369	0.238	0.341	0.218	0.312	0.196	0.299	0.196	-0.070	0.173	18.26***	21.02***

Table 4 reports the mean and median of the mispricing variables (i.e., EXVRK and EXVIA) by quartiles of the institutional ownership variables (IOV in Panel A and PROP in Panel B). EXVRK and EXVIA are winsorized at the 1% and 99% levels. \*, \*\*, \*\*\* represent statistical significance at the 10%, 5% and 1% level, respectively.

**Table 5: EXVRK and EXVIA Sorted by Institutional Ownership Proportion and Stability**

**Panel A - EXVRK Sorted by Institutional Ownership Proportion and Stability**

		PROP Low				PROP High		
		1	2	3	4	5	H-L	T-statistics
IOV Low	1	0.593	0.493	0.461	0.415	0.393	-0.200	14.65***
	2	0.581	0.535	0.502	0.451	0.447	-0.133	11.5***
	3	0.571	0.534	0.510	0.494	0.474	-0.097	7.57***
	4	0.573	0.536	0.509	0.491	0.487	-0.086	5.79***
IOV High	5	0.594	0.571	0.541	0.537	0.512	-0.082	4.56***
	H-L	0.000	0.078	0.080	0.122	0.119		
T-statistics		0	-6.49***	-6.22***	-9.11***	-8.99***		

**Panel B - EXVIA Sorted by Institutional Ownership Proportion and Stability**

		PROP Low				PROP High		
		1	2	3	4	5	H-L	T-statistics
IOV Low	1	0.361	0.290	0.246	0.239	0.223	-0.138	13.49***
	2	0.374	0.316	0.278	0.257	0.260	-0.114	12.76***
	3	0.384	0.345	0.305	0.283	0.278	-0.106	11.23***
	4	0.392	0.389	0.324	0.296	0.303	-0.089	7.1***
IOV High	5	0.414	0.421	0.391	0.388	0.395	-0.019	1.030
	H-L	0.053	0.131	0.146	0.149	0.172		

The sample is partitioned into five quintiles using PROP (i.e., the variable measuring institutional ownership proportion) first. Each quintile is then broken down into five sub-quintiles based on ownership volatility (i.e., IOV). The end result is a 5×5 matrix. Each cell represents the corresponding mean value of EXVRK in Panel A and EXVIA in Panel B. \*, \*\*, \*\*\* represent statistical significance at the 10%, 5% and 1% level, respectively.



**Table 6: OLS Regressions**

	EXVRK (1)	EXVIA (2)
$IOV_t$	0.947*** (3.68)	2.977*** (7.731)
$PROP_t$	-0.038** (-2.175)	-0.167*** (-10.455)
$LN\_SALE_t$	-0.034*** (-12.397)	-0.001 (-0.168)
$LEV_t$	0.120* (1.839)	0.212** (2.099)
$LN\_AGE_t$	-0.037*** (-9.073)	0.018*** (4.848)
$ROA_t$	0.009 (1.036)	0.037** (2.060)
$DY_t$	-0.042* (-1.894)	-0.038 (-1.411)
Year	YES	YES
Industry	YES	YES
No. of obs.	78,115	78,115
Adj.R2	0.0742	0.148

This table presents the findings of the OLS regressions. The dependent variable in Model 1 is EXVRK and in Model 2, it is EXVIA. The variables are defined in Table 2. YEAR and INDUSTRY dummy variables are used to control for the effect of unobserved economic variables and industry-specific effects, respectively. The standard errors are clustered by firms. T-statistics are reported in parentheses. \*, \*\*, \*\*\* represent statistical significance at the 10%, 5% and 1% level, respectively.

**Table 7: Fixed-effect Regressions**

	EXVRK (1)	EXVIA (2)
$IOV_t$	0.667*** (4.972)	1.237*** (6.519)
$PROP_t$	-0.061*** (-3.586)	-0.245*** (-21.742)
$LN\_SALE_t$	-0.047*** (-15.434)	-0.024*** (-11.737)
$LEV_t$	0.063*** (11.985)	0.111*** (31.728)
$LN\_AGE_t$	-0.023*** (-2.955)	0.053*** (10.300)
$ROA_t$	0.110*** (10.020)	0.090*** (12.301)
$DY_t$	-0.029 (-1.337)	-0.071*** (-4.918)
Year	YES	YES
Industry	YES	YES
No. of obs.	78,115	78,115
Adj.R2	0.128	0.084

This table presents the findings of the fixed-effect regressions. The dependent variable in Model 1 is EXVRK and in Model 2, it is EXVIA. The variables are defined in Table 2. T-statistics are reported in parentheses. \*, \*\*, \*\*\* represent statistical significance at the 10%, 5% and 1% level, respectively.

**Table 8: OLS Regressions**

	EXVRK (1)	EXVRK (2)	EXVRK (3)	EXVIA (4)	EXVIA (5)	EXVIA (6)
DED <sub>t</sub>	-0.08 (-0.243)	-	-	-0.09*** (-2.643)	-	-
QIX <sub>t</sub>	-	-0.122*** (-6.407)	-	-	-0.20*** (-9.147)	-
TRA <sub>t</sub>	-	-	0.098*** (3.347)	-	-	0.202*** (7.974)
LN_SALE <sub>t</sub>	-0.036*** (-14.468)	-0.031*** (-11.027)	-0.037*** (-14.231)	-0.008** (-2.431)	-0.001 (-0.297)	-0.006* (-1.775)
LEV <sub>t</sub>	0.120* (1.845)	0.116* (1.826)	0.121* (1.845)	0.216** (2.105)	0.210** (2.093)	0.214** (2.102)
LN_AGE <sub>t</sub>	-0.036*** (-8.970)	-0.034*** (-8.434)	-0.034*** (-8.525)	0.014*** (3.743)	0.017*** (4.578)	0.010*** (2.807)
ROA <sub>t</sub>	0.009 (1.061)	0.008 (0.961)	0.009 (1.042)	0.039** (2.057)	0.037** (2.045)	0.039** (2.045)
DY <sub>t</sub>	-0.041* (-1.869)	-0.045** (-2.039)	-0.038* (-1.752)	-0.032 (-1.279)	-0.038 (-1.451)	-0.037 (-1.422)
Year	YES	YES	YES	YES	YES	YES
Industry	YES	YES	YES	YES	YES	YES
No. of obs.	78,115	78,115	78,115	78,115	78,115	78,115
Adj.R2	0.0737	0.0753	0.0740	0.140	0.147	0.142

This table presents the findings of the OLS regressions. The dependent variable in Models 1-3 is EXVRK and in Models 4-6, it is EXVIA. The variables are defined in Table 2. YEAR and INDUSTRY dummy variables are used to control for the effect of unobserved economic variables and industry-specific effects, respectively. The standard errors are clustered by firms. T-statistics are reported in parentheses. \*, \*\*, \*\*\* represent statistical significance at the 10%, 5% and 1% level, respectively.

**Table 9: Fixed-effect Regressions**

	EXVRK (1)	EXVRK (2)	EXVRK (3)	EXVIA (4)	EXVIA (5)	EXVIA (6)
DED <sub>t</sub>	-0.080** (-2.575)	-	-	-0.220*** (-10.704)	-	-
QIX <sub>t</sub>	-	-0.079*** (-5.196)	-	-	-0.259*** (-25.555)	-
TRA <sub>t</sub>	-	-	0.113*** (4.536)	-	-	0.252*** (15.263)
LN_SALE <sub>t</sub>	-0.049*** (-16.516)	-0.046*** (-14.908)	-0.052*** (-17.304)	-0.033*** (-16.603)	-0.021*** (-10.514)	-0.030*** (-15.259)
LEV <sub>t</sub>	0.064*** (12.177)	0.062*** (11.780)	0.065*** (12.327)	0.115*** (32.726)	0.108*** (30.931)	0.115*** (32.756)
LN_AGE <sub>t</sub>	-0.020** (-2.545)	-0.021*** (-2.674)	-0.018** (-2.284)	0.071*** (13.862)	0.067*** (13.236)	0.068*** (13.365)
ROA <sub>t</sub>	0.113*** (10.248)	0.110*** (9.933)	0.111*** (10.072)	0.098*** (13.406)	0.087*** (11.938)	0.105*** (14.379)
DY <sub>t</sub>	-0.029 (-1.323)	-0.029 (-1.348)	-0.028 (-1.285)	-0.069*** (-4.779)	-0.071*** (-4.922)	-0.071*** (-4.889)
Year	YES	YES	YES	YES	YES	YES
Industry	YES	YES	YES	YES	YES	YES
No. of obs.	78,115	78,115	78,115	78,115	78,115	78,115
Adj.R2	0.129	0.128	0.148	0.072	0.064	0.07

This table presents the findings of the fixed-effect regressions. The dependent variable in Model 1 is EXVRK and in Model 2, it is EXVIA. The variables are defined in Table 2. T-statistics are reported in parentheses. \*, \*\*, \*\*\* represent statistical significance at the 10%, 5% and 1% level, respectively.

**Table 10 – Three-stage least squared regressions**

	EXVRK	IOV	EXVIA	IOV
	(1)	(2)	(3)	(4)
IOV	0.824*** (4.832)	-	0.628*** (9.715)	-
PROP	-0.054** (-7.529)	-	-0.167*** (-12.723)	-
EXVRK	-	-3.297 (-1.323)	-	-
EXVIA	-	-	-	-2.675 (-1.285)
LN_SALE	-0.541** (-17.524)	-0.962** (-12.37)	-0.622*** (-16.824)	-0.873** (-11.168)
LEV	0.237*** (3.322)	-	0.263** (2.934)	-
LN_AGE	0.041*** (-8.324)	-	0.038*** (4.983)	-
ROA	0.032*** (2.764)	-	0.0431*** (2.765)	-
DY	-0.062** (-3.424)	-	-0.078** (-2.114)	-
LN_SHARES	-	-0.074** (-32.13)	-	-0.083** (-28.517)
TURNOVER	-	-0.018** (-1.932)	-	-0.019** (-2.163)
Year	YES	YES	YES	YES
Industry	YES	YES	YES	YES
No. of obs.	56,335	56,335	56,335	56,335
Adj.R2	0.276	0.314	0.281	0.361

This table reports the results from the three-stage least squares regressions. The definitions of variables are provided in Table 2. Additionally, LN\_SHARES is the natural log of the number of shares outstanding of the firm. TURNOVER is the average of the daily ratio of trading volume to the total number of shares outstanding. \*, \*\* and \*\*\* indicate statistical significance at the 10%, 5%, and 1% level, respectively.

**Table 11 – Robustness check**

	EXVRI (1)	EXVRI (2)	EXVRI (3)	EXVRI (4)
IOV	0.193*** (-9.389)	-	-	-
PROP	-0.254*** (-25.029)	-	-	-
DED	-	-0.197*** (-9.601)	-	-
QIX	-	-	-0.242*** (-23.599)	-
TRA	-	-	-	0.223*** (-10.861)
LN_SALE	-0.020*** (-9.791)	-0.017*** (-8.485)	-0.019*** (-9.235)	-0.028*** (-14.212)
LEV	0.108*** (30.749)	0.107*** (30.704)	0.108*** (30.891)	0.114*** (32.497)
LN_AGE	0.067*** (13.079)	0.064*** (12.584)	0.065*** (12.752)	0.067*** (13.160)
ROA	0.086*** (11.778)	0.091*** (12.470)	0.092*** (12.623)	0.104*** (14.162)
DY	-0.071*** (-4.933)	-0.072*** (-5.021)	-0.072*** (-5.009)	-0.071*** (-4.906)
Year	Y	Y	Y	Y
Industry	Y	Y	Y	Y
No. of obs.	78,115	78,115	78,115	78,115
Adj.R2	0.087	0.089	0.088	0.082

This table presents the findings of the fixed-effect regressions. The dependent variable is EXVRI which is the absolute value of the natural log of the ratio between the stock price and its intrinsic value from the Ohlson's (1995) residual income value approach.  $EXVRI = \ln[\text{Price} / I(V)]$ , where Price is the stock price at the end of June of each year from CRSP, and I(V) is intrinsic value using the residual income model (Ohlson, 1995) and median values of analysts' forecasts issued in June, as in Frankel and Lee (1998). The variables are defined in Table 2. T-statistics are reported in parentheses. \*, \*\*, \*\*\* represent statistical significance at the 10%, 5% and 1% level, respectively.

**Table 12 - Fixed-effect Regressions**

**Panel A: 1981-1990**

	EXVRK (1)	EXVRK (2)	EXVRK (3)	EXVRK (4)
IOV	-0.154 (-0.278)	-	-	-
PROP	-0.198*** (-2.782)	-	-	-
DED	-	-0.240** (-2.491)	-	-
QIX	-	-	-0.054 (-1.080)	-
TRA	-	-	-	0.040 (0.466)
Controls	Y	Y	Y	Y
Year	Y	Y	Y	Y
Industry	Y	Y	Y	Y
No. of obs.	17,879	17,879	17,879	3,932
Adj.R2	0.033	0.033	0.032	0.032

**Panel D: 2001-2007**

	EXVRK (1)	EXVRK (2)	EXVRK (3)	EXVRK (4)
IOV	-0.262 (-0.444)	-	-	-
PROP	-0.080* (-1.771)	-	-	-
DED	-	-0.023 (-0.358)	-	-
QIX	-	-	-0.074** (-2.246)	-
TRA	-	-	-	0.098** (2.102)
Controls	Y	Y	Y	Y
Year	Y	Y	Y	Y
Industry	Y	Y	Y	Y
No. of obs.	4,717	4,717	4,717	4,717
Adj.R2	0.055	0.055	0.055	0.055

**Panel B: 1991-2000**

	EXVRK (1)	EXVRK (2)	EXVRK (3)	EXVRK (4)
IOV	0.329 (0.656)	-	-	-
PROP	0.047 (1.005)	-	-	-
DED	-	-0.186*** (-2.753)	-	-
QIX	-	-	-0.016 (-0.439)	-
TRA	-	-	-	0.232*** (4.796)
Controls	Y	Y	Y	Y
Year	Y	Y	Y	Y
Industry	Y	Y	Y	Y
No. of obs.	6,117	6,117	6,117	6,117
Adj.R2	0.022	0.023	0.022	0.023

**Panel E: 1981-2007**

	EXVRK (1)	EXVRK (2)	EXVRK (3)	EXVRK (4)
IOV	-0.616** (-2.092)	-	-	-
PROP	0.085*** (-4.137)	-	-	-
DED	-	0.143*** (-3.986)	-	-
QIX	-	-	0.096*** (-5.455)	-
TRA	-	-	-	0.114*** (4.051)
Controls	Y	Y	Y	Y
Year	Y	Y	Y	Y
Industry	Y	Y	Y	Y
No. of obs.	9,950	9,950	9,950	9,950
Adj.R2	0.034	0.034	0.034	0.034

**Panel C: 2001-2012**

	EXVRK	EXVRK	EXVRK	EXVRK
	(1)	(2)	(3)	(4)
IOV	0.164 (0.311)	-	-	-
PROP	-0.040 (-1.435)	-	-	-
DED	-	0.031 (0.689)	-	-
QIX	-	-	-0.042* (-1.766)	-
TRA	-	-	-	0.099*** (2.822)
Controls	Y	Y	Y	Y
Year	Y	Y	Y	Y
Industry	Y	Y	Y	Y
No. of obs.	5,690	5,690	5,690	5,690
Adj.R2	0.037	0.037	0.037	0.037

This table reports the results from the baseline regression under the context of different subsamples. The dependent variable is the EXVRK (We also run the regressions with EXVIA and EXVRI as dependent variables. However, the results are very similar to the EXVRK. So, we have decided to only report EXVRK estimations). The control variables are as same as the one that we have for baseline regressions. So, we have decided to reduce the table and report only key variables. The variables are defined in Table 2. T-statistics are reported in parentheses. \*, \*\*, \*\*\* represent statistical significance at the 10%, 5% and 1% level, respectively.



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