# Takeover Defenses: Promoting Entrenchment and Efficiency

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## Abstract

Takeover defenses have long been viewed as detrimental to firm performance. They can lead to managerial entrenchment and the associated ills of shirking, empire building and enjoying perks. However, takeover protections can also help managers make long-term oriented choices by reducing their focus on shorter term firm and price performance. In this study we find that firms that use takeover defenses to create long-term value not only perform better than those that misuse takeover protection (to enjoy a quiet life or empire build) but also do better than firms that do not have takeover protection (and face short-term pressures). Further, in examining mechanisms that cause the outperformance, we find that the R&D productivity of R&D intensive firms with high takeover protection is greater than the productivity of R&D intensive firms with low takeover protection, suggesting greater investment efficiency.

The views expressed are those of the authors and do not necessarily represent those of the Comptroller of the Currency.

# Takeover Defenses: Promoting Entrenchment and Efficiency

## 1. INTRODUCTION

Corporate takeovers have long been considered a governance mechanism that can help reduce management entrenchment and improve productive efficiency of management (e.g., Grossman and Hart, (1980), Scharfstein, 1988, Jensen, 1993). Consequently, firms that have various anti-takeover provisions (henceforth ATPs) in place are often considered to be relatively inefficient. Managerial entrenchment could manifest in several ways including shirking, empire building, enjoying perks and higher compensation and encouraging them to take on lower risk than is optimal for the firm (Borokhovich et al., 1997; Bertrand and Mullainathan 2003; Low 2009). Consistent with the inefficiency of ATPs a stream of research documents high ATP firms to be associated with lower accounting performance, lower Tobin's Q and lower reinvestment rates (e.g., Gompers, Ishii and Metrick, 2003; Bebchuk, Cohen and Ferrell, 2009; Bertrand and Mullainathan 2003).

While corporate takeover threat can improve managerial efficiency, it could also create incentives for myopic behavior on the part of managers. Fear of takeover and resulting employment risk could cause managers to take actions focused on maximizing short-term price rather than long-term value. Prior theoretical work (Stein, 1988; Bar-Gill and Bebchuk, 2003) suggests that the degree of myopic behavior will be influenced by capital market incentives that determine the extent to which a manager cares about short-term price relative to long-term value. Jensen (2005) states "when numbers are manipulated to tell the market what they want to hear… and when real operating decisions that would maximize value are compromised to meet market expectations, real long-term value is being destroyed." Bhojraj and Libby (2005) examine and find that market pressures and the inability to fully communicate information about project choices causes CFOs to choose projects that sacrifice long-term value for shorter term earnings performance.[1] Even in the absence of agency frictions, managers interested in preventing the dilution of current shareholders (by being acquired at a depressed valuation) may be forced to behave myopically. These arguments suggest that takeover protections can help managers make long-term oriented choices by reducing their focus on shorter term firm and price performance. Recent work is beginning to recognize this and provides evidence on some of the benefits of takeover protection. For example, focusing on benefits to equity holders, Cramers and Nair (2008) find that firms operating in more competitive industries have more takeover defenses and argue that in situations where long-term relationships between customers and employees are crucial, takeover protection is helpful.

The discussion above suggests that firms can benefit significantly from long-term protection. In this study we argue that firms that use takeover defenses to create long-term value should not only perform better than those that misuse takeover protection (to enjoy the quiet life or empire build) but also do better than firms that do not have takeover protection (and face short-term pressures). However, the empirical literature has tended to view high ATP firms as a monolithic group instead of recognizing that they are likely to consist of the two types of firms: those that use the benefit well and those that misuse the protection. As a result most studies show that takeover protection is detrimental to firm performance. In this study, using R&D intensity as our measure of 'managerial far sightedness', we identify firms that enjoy takeover protection and yet use it for the purpose of enhancing long-term value. We examine the long-term

[1] The issue of myopia has been examined mostly in the context of R&D expenditures. Prior papers find that managers focused on the short-term and their self-interest tend to cut R&D expenditures. Other related work includes Jacobsen and Aaker (1993) who examine the degree of information asymmetry between the manager and the market on managerial myopia and Lys and Vincent (1995) who document AT&T's willingness to burn cash to obtain short-term benefits. Roger Martin has an interesting piece on the issue of corporate takeover threat and short-termism (http://blogs.hbr.org/martin/2011/10/fixing-corporate-short-termism.html)

performance of these firms using including ROA and cash flows. We also examine valuation implications by examining current and future market-to-book multiples.

We use industry adjusted R&D expenditures to capture the likelihood that managers have chosen the quiet life outcome over the long-term value outcome. Holmstrom (1989) suggests that innovative research is harder to manage and involves greater effort. Dechow and Sloan (1991) finds that managers closer to retirement reduce the R&D expenditure consistent with a desire for the 'quiet life' and to coast till retirement. Stein (1988) suggests that R&D expenditures are a reflection of 'managerial far sightedness.' Many prior papers have used R&D to capture long-term investments (e.g., Bushee, 1998). These arguments suggest that firms with high R&D expenditures are longer term oriented and are less likely to be concerned with the 'quiet life.' We sort firms into high and low R&D groups based on whether they have R&D above the industry median R&D.

As our measure of takeover protection we use E-Index developed by Bebchuk et al. (2009). This score focuses on 6 of the 24 provisions initially detailed by Gompers et al. (2003) that are found to be most susceptible to shareholder resistance. Using the E-Index we sort firms into high and low takeover protected groups. The separation into these groups are based on median E-Index score to ensure an equal distribution in the samples. We interact these groups with high-low R&D grouping to create four groups. We expect the firms with high R&D and takeover protection to outperform the other three groups.

We begin by examining the relation between takeover protection and future return on assets and cash flows. Prior work documents a negative association of ATPs with operating performance measures (Gompers et al., 2003). We re-examine this link using a research design similar to Gompers et al., (2003) and Core, Guay and Rusticus (2006). We measure performance in terms of their one- two- and three-year ahead return on assets, and operating cash flow to total assets. We find negative association between ATPs and future one, two and three year industry-adjusted return on asset or cash flow to assets for our full sample period. However, examining the relation between ROA and our partitions we find that protected firms with high R&D perform the best in terms of the future ROAs. They outperform protected firms with low R&D. To control for the possibility that the R&D partition is driving our results we examine the difference in performance between the R&D intensive and non-intensive firms in the low protection group and find no difference between the groups. Further, the difference in coefficients between the high and low intensity groups within the protected firms is larger than that between the groups within the unprotected group. We also find that R&D intensive firms in the protected group perform significantly better than firms with high R&D and low takeover protection. The outperformance also gets economically larger as we go out in time. Similar results are observed using cash flows. These findings are interesting in that they support the possibility that some firms use takeover protections to improve long-term performance, while other use it to enjoy the quiet life.

The outperformance of protected R&D intensive firms over low protection R&D intensive firms is particularly interesting. These are both groups where managers seem to have displayed a predilection for long-term value enhancement. Yet the protected firms seem to benefit from the takeover protection. To examine this issue further we examine one potential source of the outperformance which is productivity of the R&D across these two groups.

Stein (1988) models a setting where a higher threat of takeovers, i.e., firms with low ATPs, causes managers to respond myopically by taking action to boost short-term earnings and price at the expense of long-term value. Meulbroek et al., (1990) empirically test the predictions in Stein's model by examining investments in R&D. They find that contrary to the predictions, R&D investments are relatively lower for firms with higher takeover defenses. They conclude that their results are consistent with anti-takeover defenses helping to entrench management. However, in a subsequent paper Bebchuk and Stole (1993) extend Stein's model and point out that the general belief that myopic behavior results in underinvestment in long-term projects is flawed and depends on the characteristics of the project. They find that when the level of investment in long-term projects is observable but the productivity is not known (as in the case of R&D), myopic behavior will result in overinvestment, contrary to Stein's prediction.[2] The intuition behind this finding is that the firm uses the level of investment to signal the long-term productivity of the projects (akin to Spence (1973) where talented individuals overinvest in education to signal their type). As discussed in Bebchuk and Stole (1993) an implication of their paper is that could be viewed as being consistent with ATPs reducing myopia rather than encouraging entrenchment. This is because firms that were presumably underinvesting in R&D could be viewed as undertaking an efficient level of investment in R&D and that other firms were, in fact, overinvesting. Our future ROA results seem consistent with this possibility. The reduction in myopia (from high ATPs) hypothesis and the resulting more efficient investment suggests that R&D of firms with high ATPs would be more profitable in the future as compared with the overinvestment in R&D by firms with low ATPs, which is consistent with the future ROA findings in this paper. In addition, the hypothesis would suggest that the productivity of the R&D expenditures should be higher.

We attempt to separate between the two possibilities by focusing on R&D payoff using two approaches. The first approach, linking R&D capital to Tobin's Q, is based on extensive

[2] In the alternative case where the level of investment is not known (e.g., managerial effort and time, internal projects that are not observable), the generally believed underinvestment will occur (consistent with Stein, 1988).

work in economics and adopted in finance and accounting research (e.g., Griliches 1981; Hall 1993; Chen et al., 2003; Hall and Oriani 2006; Grandi, Hall and Oriani (2009); Merkeley 2011). The approach imputes the capitalized value of R&D and estimates the valuation coefficient on this capital. We find that the valuation coefficient for R&D intensive firms with high takeover defenses is significantly higher than the coefficient for R&D intensive firms with low takeover defenses. The second approach we use examines the impact of current and past R&D on current earnings (e.g., Lev and Sougiannis 1996). This method examines the earnings payoff (i.e., mapping of R&D into earnings). Regressing future ROAs (calculated as earnings before R&D/Total assets) on capitalized R&D we find that the coefficients is higher for protected R&D intensive firms than for unprotected R&D intensive firms.

This paper makes two key contributions. First, we recognize that the group of firms with high takeover defense consists of two distinct types of firms. We suggest and find that some managers can use takeover protection enhance firm performance while other managers choose to misuse it to lead a quiet life. Second, we contribute to the literature on managerial myopia by providing some evidence that myopia can cause overinvestment. This is an intriguing finding because by highlighting the contrasting results between levels of investment and efficiency of investment this paper contributes to the large stream of literature that uses levels of investment (particularly R&D investments) and changes in the levels as a proxy for myopic behavior. This paper suggests that focusing on levels or changes in R&D expenditure could be misleading because low R&D (or a cut in R&D) could reflect more efficient investment (or a move towards more efficient investment), rather than underinvestment (as assumed by the myopia argument). A better metric to use would be the investment efficiency or payoff.[3] Our results suggest that it

[3] The ideal metric to determine over or underinvestment is to examine the efficiency of the marginal dollar of investment, though in the average efficiency can be viewed as a reasonable proxy.

may be a bit premature to conclude that ATPs necessarily hurt shareholders' interests and firm performance.

Our paper is related to a stream of work that suggests that takeover defenses are viewed positively by debt-holders because it reduces the likelihood of takeovers that load the balance sheet up with debt. Francis, Hasan, John and Waisman (2010) find that firms with more ATPs enjoy lower bond yields and higher bond values and Chava, Livdan and Purnanandam (2009) find firms with higher ATPs to have a higher spread on their bank loans suggesting that debtholders view ATPs positively.[4] Finally, recent work has also found evidence contrary to the earlier work associating ATPs with market inefficiencies. Johnson, Moorman and Sorescu (2009) find that excess returns generated from sorting firms into portfolios based on ATPs, documented in prior work, disappear after making appropriate adjustments to correct for industry effects.

The rest of the paper is organized as follows. Section 2 discusses the research design and the data. Section 3 provides the results and section 4 concludes the paper.

## 2. RESEARCH DESIGN

### *2.1. Sample Selection*

Our primary sample consists of all firms with information on takeover defenses. The original source of this information is the *Investor Responsibility Research Center* (IRRC) which collects information on 24 anti-takeover provisions, for a sample of about 1,500 firms, starting in 1990. These include state laws and corporate charter provisions such as, poison pills and

[4] These papers focus on debt-holders. The argument they provide is that ATPs prevent wealth transfers from debt to equity and so these papers do not necessarily contradict prior work that tends to focus on equity holders and firm performance.

classified boards, which make takeovers costly. Gompers et al. (2003) created a governance index which is based on a count of the number of these anti-takeover provisions a firm has in place. Recently, Bebchuk et al., (2009) showed that 6 of the 24 provisions have the strongest impact. These provisions are: staggered boards, limits to shareholder bylaw amendments, poison pills, golden parachutes, and supermajority requirements for mergers and charter amendments. Therefore, in our study we use *EINDEX*, the number of these six provisions a firm has in place, as our measure of a firm's takeover defenses. We use the data shared by Bebchuk for our analyses. We also conduct separate analysis using all 24 takeover defense measures and this yields similar results to those using the *EINDEX*.

From 1998, the IRRC started providing information on ATPs provisions every alternate year. Prior to this period, in some cases data were missing for two consecutive years. Therefore, *EINDEX* information are available for the years IRRC data are available but following most of the prior studies using these measures, for missing years we use the last available year's information (e.g., Gompers et al. 2003; Core et al., 2006). This helps us increase the sample size considerably but can also introduce noise; to the extent that the indices changes over this period. However, research indicates that these indices are relatively stable over time (e.g., Gompers et al., 2003), suggesting the error resulting from this assumption may be not extreme.

Our initial sample consists of all firms with information on *EINDEX* for the year 1990-2007, yielding 24,823 observations. We eliminated all financial firms (3,802 observations) and also lost another 533 observations because variables needed to compute certain financial measures were not available in COMPUSTAT yielding 20,488 usable observations. The sample selection process is described in panel A of table 1.[5]

[5] We examine our results using alternative samples. One sample consists of only R&D firms. The advantage of this approach is we eliminate firms that do not carry out R&D activities from the low intensity group. This is a good

[Insert table 1]

Panel B of table 1 shows the industry distribution of the sample using Fama-French 13 level industry classification. The table shows that Durable Manufacturers is the biggest group with a quarter of the sample represented. Computers and Retail are the next two largest group. All groups have some representation and financials are excluded. To ameliorate any industry effects we either industry adjust our dependent variable or use industry controls where necessary.

Our primary objective is to identify whether the performance effects of ATPs differ according to investment horizon. In order to answer this question we divide the sample into four panels (2x2) based on a whether a firm's *EINDEX* and research and development expenditures deflated by sales (*RND*) exceeds or falls short of the median value for the industry and year. We define industries as in Fama-French (48 level industries). Firms with high and low values of *EINDEX* are labeled as *HIEI* and *LOEI* respectively. Firms with high and low values of *RND*, are labeled as *HIRD* and *LORD* respectively. The 2x2 grouping scheme then results in the following 4 groups: HIEI_*HIRD, HIEI_LORD, LOEI_HIRD* and *LOEI_LORD*.

The high-RND groups represent firms that have a relatively longer planning horizon. The question we investigate is whether these firms use takeover defenses to improve their operating efficiency or whether higher ATPs lead them to operate relatively inefficiently. Therefore, our 4-way grouping scheme allows us to parse out the differences in the effects of ATPs across different groups of firms and allows us to draw conclusions beyond the simple aggregate effect of ATPs on firm performance.

*2.2 ATPs and Operating Performance*

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because their lack of R&D has nothing to do with the quiet life argument. The disadvantage of this approach is that we could be dropping firms that do not carry out R&D because they would like to enjoy a quiet life and those are precisely the firms we want in the low intensity group. Another sample we examine is to drop firms in industries where no firm has R&D expenditure. This approach ameliorates some of the issues discussed above. Results using both samples are similar to those using the main sample.

The link between ATPs and firm performance is a well-researched topic. Early studies using data for 1990-1999 have documented a negative or insignificant association between ATPs and firm performance (e.g., Gompers et al. 2003; Core et al. 2006). In contrast to prior work that explores the aggregate effect of ATPs on operating performance we analyze the difference in operating performance across different ATP and RND groups. One measure of operating performance is ROA defined as ratio of operating income after depreciation divided by total assets. As in Core et al. (2006) we industry-adjust this variable using the median value of ROA for each of the Fama-French 48 industry groups and year to get the dependent variable of interest: *INDROA*. We report out results using two specifications. Our first specification is the one used by Core et al. (2006) and uses *EINDEX* without the groups and includes the log of market value of common equity (*LOGMVAL*) and the log of the ratio of book value of equity to the market value of equity (*LOGBTM*) as the two control variables. While Core at al. (2006) analyzes one-period-ahead *ADJROA* only, we also examine two and three period ahead *ADJROA* as well. The regression specification is:

$$INDROA_{t+i} = \beta_0 + \beta_1\, EINDEX + \beta_2\, LOGMVAL + \beta_3\, LOGBTM, \qquad (where\ i=1,2,3) \qquad (1)$$

Our second specification uses the four-way grouping scheme discussed above instead of the *EINDEX*. This specification is as follows:

$$INDROA_{t+i} = \beta_0 + \beta_1\, HIEI\_HIRD + \beta_2\, HIEI\_LORD + \beta_3\, LOEI\_HIRD + \beta_4\, LOGMVAL + \beta_5\, LOGBTM, \qquad (where\ i=1,2,3) \qquad (2)$$

We estimate both equations (1) and (2) year-by-year using data for 1990-2007 and provide Fama-MacBeth results based on these coefficients. T-values are adjusted for serial correlation using the Newey and West (1987) procedure.

If takeover protection helps firms with longer planning horizon to operate more efficiently, we expect $\beta_1$ in equation (2) to be positive. We expect the coefficients on coefficients on $\beta_2$ , and $\beta_3$ to be negative.

*2.3 ATPs and Operating Cash Flows*

Next we test the effects of takeover defenses on a measure of a firm's operating cash flows. Our proxy for operating cash flows is operating income *before* depreciation. The measure we use (*OPCASH*) is the ratio of operating income before depreciation, deflated by total assets. As in Core et. al, (2006), we use industry-adjusted values using the median value for *OPCASH* for each Fama-French industry and year group. In our basic specification, we regress one-period, two-period, and three-period ahead operating cash flows on *LOGMAL* and *LOGBTM* yielding the following regression:

$$INDOPCASH_{t+i} = \beta_0 + \beta_1\, EINDEX + \beta_2\, LOGMVAL + \beta_3\, LOGBTM, \quad (where\ i=1,2,3) \qquad (3)$$

Next we replace *EINDEX* with the group dummies HIEI*_HIRD, HIEI_LORD,* and *LOEI_HIRD* resulting in the following specification:

$$INOPCASH_{t+i} = \beta_0 + \beta_1\, HIEI\_HIRD + \beta_2\, HIEI\_LORD + \beta_3\, LOEI\_HIRD + \beta_4\, LOGMVAL + \beta_5\, LOGBTM, \quad (where\ i=1,2,3) \qquad (4)$$

As for the ROA regressions, Fama-McBeth coefficients and t-values corrected for serial correlation are reported. A positive coefficient for $\beta_1$ in equation (4) would indicate that takeover protection results in greater operating performance for high-RND firms.

*2.4 ATPs and Market-to-Book*

We examine the valuation implications of our partitions by examining the market-to-book multiple. This multiple is widely used in the asset pricing literature to separate between value and growth firms. Prior work has also found that factor mimicking portfolios created using this multiple are systematically related to returns (Fama and French 1993). We examine the association between our partitions and current as well as future multiples. We also examine the change in multiples over a three year period.

*2.5 ATPs and Research and Development*

We find that R&D intensive protected firms earn high future ROAs as compared with R&D intensive firms that are not protected. One potential explanation for this result is that takeover protection facilitates a reduction in myopia thereby reducing overinvestment. To examine this possibility in our second set of tests we examine the value of R&D capital between the two groups using two approaches. Several papers in economics and finance (Hall (1990), Lev and Sougiannis (1996) and Chan, Lakonishok and Sougiannis (2001)) posit that a firm's value or productivity is a function of the tangible and intangible capital it has in place. Tangible capital is reflected on the balance sheet whereas intangible capital, particularly those arising from research and development activities, are not, as these costs are expensed as incurred. Therefore these studies create a measure of R&D capital based on R&D expenditures of prior periods. The calculation involves some assumption on the length of time over which R&D expenditures would yield benefits and the amortization schedule of the capitalized R&D. Following Chan et al. (2001) we define R&D capital as:

$$RNDCAP_t = RND_t + 0.8RND_{t-1} + 0.6RND_{t-2} + 0.4RND_{t-3} + 0.2RND_{t-4} \quad (5)$$

Where, *RND* represents research and development expenditures. This calculation assumes that all R&D expenditures are initially capitalized than amortized annually at 20 percent rate per year.[6]

Lev and Sougiannis (1996) relates a firm's earnings to tangible and intangible assets of the firm. Following their work, we estimate the future productivity of R&D capital as follows:

$$INDADJROA_{t+1} = \alpha_0 + \alpha_1 HIEI\_HIRD + \alpha_2 RNDCAP + \alpha_3 HIEI\_HIRD*RNDCAP + \alpha_4 BTM + \alpha_5 LOGMVAL + \alpha_6 LEV + \alpha_7 LCOMPAGE + industry\ dummies + year\ dummies \quad (6)$$

Where, *HIEI_HIRD*, *ROA* and *RNDCAP* are as defined earlier. We add controls for firm size (*LOGMVAL* representing the log of market value), leverage (*LEVERAGE*) given by the ratio of current and long term debt deflated by total assets, book-to-market ratio (*BTM*) to capture growth effects and firm age (*LCOMPAGE*, representing the log of company age, in years) to measure firm maturity and risk. The coefficient of interest in our study is $\alpha_3$. If firms with a greater number of anti-takeover provisions are making more efficient in their R&D investments, the coefficient for $\alpha_3$ should be positive.

Hall (1990, 1993) relates firm value to tangible and intangible capital of the firm using a Cobb-Douglas production function with constant returns to scale as follows:

$$V = q\ (A + \gamma K) \quad (7)$$

Where V is the market value of equity of a firm; A represents the firm's tangible assets, defined as the sum of inventories and net property plant and equipment; and K is the capitalized value of research and development expenditures. Dividing both sides of equation (7) by A, and taking logs simplifies to:

$$log(V/A) = log(q) + log[1+\gamma\ (K/A)] \quad (8)$$

Equation (8) can be estimated as a non-linear equation and $\gamma$ represents the valuation effect of

[6] Different studies make slightly different assumptions about the amortization rate but prior work also suggests that these variations do not have a significant impact on results. We also examined a 15 percent amortization rate as in Hall (1990) but this did not affect any of our qualitative conclusions.

R&D capital.

Using this approach, for the valuation model (equation 8) we estimate $\gamma$ separately across R&D intensive firms in high and low takeover groups and compare the coefficients between the two groups.

## 3. RESULTS

Summary statistics of the key variables used in the regression analyses are reported in table 2. To mitigate the effect of outliers, we winsorize the top and bottom 1 percent of all continuous variables. Panel A of the table provides information on the entire sample. The average market value of the companies is $5 billion (median of $1.14 billion). This large average market value is because takeover defense information is collected by IRRC for the bigger firms; therefore our sample consists of bigger firms as compared to the *Compustat* population. However, there is significant variation in size across the sample as indicated by the standard deviation of over $13.7 billion. Average cash flow to assets is 16 percent. On average, firms seem to have about 2.4 takeover defenses in place while average return on assets is about 11 percent. The INDROA is 6% while the median is 3%. The reason that INDROA is higher than zero is that the industry averages are calculated for the entire sample while the takeover defense firms are larger than the population average.

Panel B provides summary statistics information for various measures across our four partitions. As would be expected the average EINDEX values are significantly higher in the two high EINDEX groups (5.58 and 3.59) compared with the low EINDEX firms (1.30 and 1.26). It is interesting to note that the HIEI_HIRD firms have significantly greater takeover protection than the HIEI_LORD firms. This is interesting because it shows that high takeover defenses do not prevent the firms from investing for the long-term and that high takeover defense does not automatically imply a desire for a quiet life. The ROAs across the four subgroups vary between 10 and 11 percent, while the in INDROA is higher for the protected firms as compared with the unprotected firms. HIEI_HIRD firms are significantly smaller than the LOEI_HIRD firms suggesting that size has to be accounted for in the analyses. As would be expected R&D intensive firms have higher market-to-book (MTB). There are more firms in the low intensive groups as would be expected. It is also reassuring that creating the four groups using independent sorts did not result in small samples in any of the groups. The ratio of the number of firms in the high EINDEX group (3,438/6,314) is similar to that in the low EINDEX group (3,684/7,052).

[Insert table 2]

*3.1. ATPs and firm performance*

Prior studies have documented either a negative or an insignificant association between ATPs and firm performance. Therefore we re-examine the link between ATPs and operating performance using our sample which has a longer time period and is therefore larger than those of Gompers et al. (2003). Gompers et al. (2003) use one-period-ahead industry-adjusted return-on-equity as one of their performance measures. Here we replicate their analyses using their specification and variable definitions and add two and three period ahead performance. The results are summarized in table 3. We find *EINDEX* to be negatively associated with *INDROA* and statistically significant in the one-period-ahead industry-adjusted return on assets specification.[7] In the other two specifications (two-year and three-year ahead INDROA) the coefficients continue to be negative but are no longer significant. Size is positively associated with ROA over all time periods which is consistent with the notion that larger firms earn higher

[7] Using an indicator variable for high or low EINDEX groups yields an insignificant association.

profits. Book-to-market is negatively associated with future ROAs which is consistent with the notion that high book-to-market firms have low valuation owing to poor performance.

However, focusing on our partitions yields very interesting results. Looking at one year ahead ROA, we find that HIEI_HIRD is positive and statistically significant. Given that the coefficients are all expressed relative to LOEI_HIRD, the coefficient suggests that membership in HIEI_HIRD results in a 70bps increase in INDROA in the following year which is economically very significant. The result suggests that takeover protection can be beneficial even in a sample of R&D intensive firms. Comparing the coefficients of HIEI_HIRD to HIEI_LORD and LOEI_LORD we find that HIEI_HIRD is economically and statistically higher than the other two. Finally, the difference in coefficients between HIEI_HIRD and HIEI_LORD is 110bps which is economically and statistically larger that the difference between LOEI_HIRD and LOEI_LORD which is 20bps.

The results for the two-period and three-period ahead ROAs are very similar to those discussed for one period ahead ROA. The coefficient on HIEI_HIRD becomes larger, implying a greater spread between R&D intensive firms with and without takeover protection. The outperformance of HIEI_HIRD persists three years into the future which reinforces the idea that takeover protection can lead to firms benefiting over the long run. The coefficient on HIEI_LORD is negative but not significantly different as compared with the LOEI_HIRD group. However, when examining 3-year ahead performance, we find that the HIEI_LORD group economically and statistically significantly underperforms the LOEI_HIRD group. This is interesting because it suggests that the takeover protected group that is likely to engage in quiet life has performance that is no different than R&D intensive protected firms with no takeover protection in the short term but underperform in the longer-term.

[Insert table 3 here]

As an alternative test of the effect of ATPs on firm performance, we use a cash flow based measure of firm performance. We use EBITDA as the proxy for cash flows and scale it by assets. As with ROA we examine one- two- and three-year ahead industry adjusted ratios based on Fama-French industry codes (INDOPCASH). The model we estimate is given in equation (4) and the results are reported on table 4. In the regression without any partitioning, one period ahead INDOPCASH is negatively associated with *EINDEX*, consistent with prior work that takeover provisions can be detrimental to firm performance. There is no significant association between EINDEX and two and three period ahead INDOPCASH. Examining the association between our partitions and one period ahead INDOPCASH yields interesting insights. HIEI_LORD has a statistically and economically (60bps) higher than the effect on INDOPCASH as compared with LOEI_HIRD. This finding is similar to that in Table 4. As with INDROAs this effect persists into years two and three and becomes stronger in year three (90bps). Further, HIEI_LORD has a greater negative effect on INDOPCASH as compared with LOEI_LORD (-70bps). This finding is consistent with takeover defenses having a detrimental effect on firm performance for the low R&D intensity firms. The negative effect persists into years two and three and becomes stronger in year three (-100bps). The coefficient on LOEI_LORD is negative but is significant only in the year three regression. Size is positively associated with cash performance and book-to-market is negatively associated with cash performance.

Taken together, our tests suggest that ATPs, if used wisely, can allow firms to benefit through the protections offered by them, but can also hurt firm performance if used to enjoy the quiet life.

[Insert table 4 here]

*3.2. ATPs and Market-to-Book*

While Table 3 and 4 provide evidence on the future performance of firms in our four partitions, we also examine the valuation implications by focusing on the effect of takeover defenses on market-to-book multiples. Table 5 provides results from this analysis. The results using current industry adjusted multiples suggest that firms in the HIEI_HIRD group have lower multiples than those in the LOEI_HIRD group. However, examining the three-year ahead multiple we find no difference between the two groups. The change between the three year ahead multiple and the current multiple is significantly higher from the HIEI_HIRD group as compared with the LOEI_HIRD group. This finding suggests that the HIEI_HIRD group enjoy a greater multiple expansion as compared with the other group and is consistent with the better performance observed from that group. The HIEI_LORD and LOEI_LORD groups both have lower multiples as compared with LOEI_HIRD group. This is consistent with these groups have lower R&D intensity and therefore having less growth options. It is compounded by the generally poorer performance observed from these firms in the prior tables. An interesting contrast is between the HIEI_LORD and LOEI_LORD groups. Comparing the two groups we find that the HIEI_LORD firms suffer the lowest valuation multiple and the compressed multiples persist over the next three years. This finding is consistent with the market perceiving these firms as enjoying the quiet life and accordingly discounting their valuation.

[Insert table 5 here]

*3.5. ATPs and Research and Development Expenditures*

Table 6 presents the results on the association between ATPs and capitalized R&D expenditures, as expressed in equation 6. The sample consists only of firms with high R&D intensity. Results are provided using the Fama-MacBeth approaches. Column 1 provides results using one period ahead INDADJROA. The coefficients on both capitalized R&D (RNDCAP) and high intensity protected firms are not significant. Our primary focus is the coefficient on the interaction between RNDCAP and HIEI_HIRD which is positive and significant. This suggests that R&D investments made by protected firms generate higher industry adjusted ROA over the following year as compared with R&D investments made by unprotected firms. Columns 2 and 3 show that the association persists over the next two years. This finding is consistent with takeover protected firms making R&D investments that are more productive. As with table 4 BTM is negatively associated with INDADJROA while size is positively associated with INDADJROA.

[Insert table 6 here]

We examine this issue further by using the alternative specification detailed in equation 8. Unlike the approach in Table 6 which examines future profitability, this method focuses on the valuation implications of the capitalized R&D. Using the method described in equation 8, we find that the average of the yearly gammas (over 18 years) for the protected firms is 3.15. This can be interpreted as the market valuing R&D assets at a 215% premium to tangible assets for this group. The average for the low protection group is 2.56 which implies a premium of 156%. This difference between the two is 0.59, which represents and additional premium of 59% and is statistically and economically significant. Of the eighteen years for which gammas are calculated for each of the two groups, the gamma for the protected group is higher than the low protection groups in 16 years. These results provide additional support to the findings in Table 6 that takeover protection helps with more productive R&D investing.

## 4. Conclusion

This paper examines the fundamental premise in the ATP literature that ATPs are generally detrimental to firm performance by facilitating entrenchment and a quiet life. ATPs have been too prevalent for too long to be uniformly pernicious. In this study we examine the possibility that while some firms use takeover protection to the detriment of shareholders other use it to reduce myopic behavior and therefore improve future performance. Our evidence points to firms with high ATPs that display high commitment to long-term performance (measured using R&D intensity) having *highest* future ROAs and cash flows as compared with other groups. The ROAs and cash flows are higher than firms than firms with low ATPs that display the same commitment. One explanation proposed in the paper is that by reducing short-term market pressures, takeover protections allow for more optimal investments. We find that R&D productivity is higher for the protected firms. The paper adds to a small but growing literature questioning the general perception that ATPs are uniformly pernicious. We suggest that depending on the circumstances ATPs could be beneficial to firm performance.

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APPENDIX A

*Variable Definitions*

| | |
|---|---|
| *EINDEX* | Entrenchment index based on 6 of the 24 takeover defenses reported by the IRRC. These are: staggered boards, limits to shareholder bylaw amendments, poison pills, golden parachutes, and supermajority requirements for mergers and charter amendments. EINDEX takes the value 0 if none of these provisions are present and 6 if all the provisions are present in a company. |
| *RND* | Research and development expenditures divided by net sales. If data on R&D expenditures are missing, this is set to zero. |
| *HIEI_HIRD* | An indicator variable that takes the value of 1 for all firms that have higher-than-median value of *EINDEX* and *RND* among firms within a Fama-French (48 level) industry-year group, and zero otherwise. |
| *HIEI_LORD* | An indicator variable that takes the value of 1 for all firms that have higher-than-median value of *EINDEX* and lower-than median value of *RND* among all firms within a Fama-French (48 level) industry-year group, and zero otherwise. |
| *LOEI_HIRD* | An indicator variable that takes the value of 1 for all firms that have lower-than-median value of *EINDEX* and higher-than median value of *RND* among all firms within a Fama-French (48 level) industry-year group, and zero otherwise. |
| *LOEI_LORD* | An indicator variable that takes the value of 1 for all firms that have lower-than-median value of *EINDEX* and *RND* among all firms within a Fama-French (48 level) industry-year group, and zero otherwise. |
| *ROA** | Operating income after depreciation, deflated by total assets at the end of the year. |
| *OPCASH** | Operating income *before* depreciation, deflated by total assets at the end of the year. |
| *INDROA* | ROA minus the median value of ROA for each Fama-French (48 level) industry-year group. |
| *INDOPCASH* | OPCASH minus the median value of OPCASH for each Fama-French (48 level) industry-year group. |
| *LEVERAGE* | Total long-term debt plus debt in current liabilities deflated by total assets. |
| *LOGMVAL* | The log of the market value of common equity |
| *BTM*** | The ratio of book value of common equity to the market value of common equity. |
| *LOGASSET* | The log of total assets at the end of the fiscal year. |
| *CAPEXP* | Operating cash flow plus investing cash flow, divided by total assets. |
| *LCOMPAGE* | The natural log of company age (in years). |
| *DIVERSE* | An indicator variable that takes the value 1 if two or more SIC codes are reported for a firm on COMPUSTAT; 0 otherwise. |
| *RNDCAP* | Value of R&D capital deflated by total assets at the end of the year. R&D capital is estimated based on the assumption that research and development expenditures are capitalized in the year of the expenditure and amortized straight line over five years. Therefore $RNDCAP = (RND_t + 0.8RND_{t-1} + 0.6RND_{t-2} + 0.4RND_{t-3} + 0.2RND_{t-4}) / total\ assets$. |
| *GAMMA* | Measure of production efficiency based on Hall (1993). It is the $\gamma$ estimated from the following nonlinear regression: $log(V/A)= log(q) + log[1+\gamma\ (K/ A\ )$; where V is the market value of equity, A is the sum of property, plant and equipment and inventories, and K is the total value of capitalized R&D capital. |
| | |

*We deflate by end-of-the-year assets to be consistent with Core et al. (2006).

**In the valuation regression the dependent variable is *MTB* (market value of equity divided by book value of equity) rather than *BTM*.

TABLE 1

*Sample Selection and Distribution*

| *PANEL A: Sample Selection Screens* | *Observations* |
|---|---|
| Initial sample with GINDEX and EINDEX data available for 1990-2007 | 24,823 |
| Less: Financial firms for which earnings management measures could not be computed | (3,802) |
| Firms for which other financial measures could not be computed | (533) |
| Final sample | 20,488 |

| *PANEL B: Industry Distribution** | *Observations* | *%* |
|---|---|---|
| Mining & construction | 449 | 2.19 |
| Food | 688 | 3.36 |
| Textiles & printing/publishing | 1,778 | 8.68 |
| Chemicals | 927 | 4.52 |
| Pharmaceuticals | 665 | 3.25 |
| Extractive | 757 | 3.69 |
| Durable Manufacturers | 5,214 | 25.45 |
| Computers | 2,650 | 12.93 |
| Transportation | 1,115 | 5.40 |
| Utilities | 1,923 | 9.39 |
| Retail | 2,773 | 13.53 |
| Services | 511 | 2.49 |
| Other | 1038 | 5.07 |
| TOTAL | 20,488 | 100 |

*Industry membership is determined by SIC code as follows: mining & construction (1000- 1999, excluding 1300-1399), food (2000-2111), textiles & printing/publishing (2200-2799), chemicals (2800-2824, 2840- 2899), pharmaceuticals (2830-2836), extractive (2900-2999, 1300-1399), durable manufacturers (3000-3999, excluding 3570-3579 and 3670-3679), computers (7370-7379, 3570-3579, 3670-3679), transportation (4000-4899), utilities (4900-4999), retail (5000-5999), and, services (7000-8999, excluding 7370-7379). Financials (6000-6999) are excluded and "Other" includes the rest. Distribution based on 24,340 observations over 1990-2007.

TABLE 2

*Summary statistics for Selected Variables*

This table reports descriptive statistics of selected variables used in the analysis. Variables are defined in Appendix A.

| *Panel A: Summary statistics based on full sample* | | | | | | |
|---|---|---|---|---|---|---|
| *Variable* | *N* | *Mean* | *Median* | *STD* | *Q1* | *Q3* |
| *EINDEX* | 20,488 | 2.37 | 2.00 | 1.36 | 1.00 | 3.00 |
| *ROA** | 20,488 | 0.11 | 0.97 | 0.10 | 0.06 | 0.15 |
| *INDROA*$_{t+1}$ | 19,589 | 0.06 | 0.03 | 0.12 | -0.01 | 0.10 |
| *OPCASH** | 20,488 | 0.16 | 0.15 | 0.10 | 0.10 | 0.21 |
| *MVAL*** | 20,488 | 4.99 | 1.14 | 13.71 | 0.43 | 3.40 |
| *MTB**** | 20,488 | 3.01 | 2.12 | 3.06 | 1.44 | 3.39 |
| *LEVERAGE* | 20,488 | 0.93 | 0.56 | 1.55 | 0.18 | 1.09 |

| *Panel B: Summary statistics by Groups: mean (median)* | | | | |
|---|---|---|---|---|
| | HIEI_HIRD | HIEI_LORD | LOEI_HIRD | LOEI_LORD |
| *EINDEX* | 5.58 (3.00) | 3.59 (3.00) | 1.30 (1.00) | 1.26 (1.00) |
| *ROA** | 0.10 (0.10) | 0.11 (0.10) | 0.10 (0.09) | 0.11 (0.10) |
| *INDROA*$_{t+1}$ | 0.07 (0.38) | 0.05 (0.03) | 0.07 (0.04) | 0.06 (0.03) |
| *OPCASH** | 0.15 (0.15) | 0.15 (0.14) | 0.15 (0.14) | 0.16 (0.15) |
| *MVAL*** | 4.98 (1.29) | 3.39 (1.12) | 8.60 (1.44) | 4.56 (1.03) |
| *MTB**** | 3.39 (2.34) | 2.51 (1.96) | 3.70 (2.62) | 2.90 (1.98) |
| *LEVERAGE* | 0.22 (0.21) | 0.27 (0.28) | 0.18 (0.15) | 0.25 (0.26) |
| *N* | 3,438 | 6,314 | 3,684 | 7,052 |

*In the regressions, industry-adjusted measures are used.

**MVAL is the market value of common equity in $ billions. In the regressions log of market value of common equity (in $ millions) is used.

***Represents the ratio of market value of equity to book value of equity. In certain regressions BTM, the ratio of book value of equity to the market value of equity is used to be consistent with prior research.

TABLE 3

*Takeover Defenses and Return on Assets*

This table reports the results of Fama-McBeth regressions of industry-adjusted ROA on takeover defenses and other control variables. The dependent variable is the industry-adjusted return on assets defined as operating income after depreciation divided by total assets at the end of the year (*INDROA*). Industry adjustments are done by deducting the median ROA of each Fama-French industry-year group. Columns 3 & 4 report results based on one-period-ahead return on assets, columns 5 & 6 report results based on two-period-ahead return on assets and columns 7 & 8 report results based on three-period-ahead return on assets. Yearly regressions are run for the years 1990-2007 and Fama-McBeth regressions t-values, adjusted for serial correlation using the Newey and West (1987) procedure, are reported below each coefficient. All continuous variables are winsorized at the top and bottom 1 percent. Variables are defined in appendix A. ***, **, * represent statistical significance at 0.01, 0.05 and 0.1 levels, respectively.

| | *Expected sign* | *One-period-ahead INDROA* | | *Two-period-ahead INDROA* | | *Three-period-ahead INDROA* | |
|---|---|---|---|---|---|---|---|
| *INTERCEPT* | ? | -0.063 | -0.070 | -0.054 | -0.057 | -0.042 | -0.042 |
| | | (0.0002) | (-4.91)*** | (-3.84)*** | (-4.06)*** | (-2.68)** | (-2.71)** |
| *EINDEX* | ? | -0.002 | | -0.001 | | -0.001 | |
| | | (-2.68)** | | (-1.61) | | (-1.67) | |
| *HIEI_HIRD* | + | | 0.007 | | 0.010 | | 0.010 |
| | | | (3.07)*** | | (3.64)*** | | (3.59)*** |
| *HIEI_LORD* | ? | | -0.004 | | -0.004 | | -0.007 |
| | | | (-1.04) | | (-1.16) | | (-1.83)* |
| *LOEI_LORD* | ? | | 0.002 | | -0.001 | | -0.005 |
| | | | (0.65) | | (-0.27) | | (0.004) |
| *LOGMVAL* | + | 0.021 | 0.021 | 0.018 | 0.018 | 0.017 | 0.017 |
| | | (15.54)*** | (15.26)*** | (13.04)*** | (12.93)*** | (11.34)*** | (11.18)*** |
| *BTM* | - | -0.047 | -0.047 | -0.043 | -0.043 | -0.042 | -0.042 |
| | | (-3.1)*** | (-3.09)*** | (-3.27)*** | (-3.25)*** | (-3.39)*** | (-3.38)*** |
| *# of obs.* | | 19,589 | | 18,715 | | 17,877 | |
| *Avg. R square* | | 13.39% | 13.17% | 10.94% | 13.31% | 10.88% | 11.06% |

TABLE 4

*Takeover Defenses and Operating Cash flows*

This table reports the results of Fama-McBeth regressions of industry-adjusted operating cash flows on takeover defenses and other control variables. The dependent variable is the industry-adjusted value of operating income *before* depreciation divided by total assets at the end of the year (*INDOPCASH*). Industry adjustments are done by deducting the median *OPCASH* of each Fama-French industry group. Columns 3 & 4 report results based on one-period ahead cash flows, columns 5 & 6 report results based on two-period-ahead cash flows and columns 7 & 8 report results based on three-period-ahead cash flows. Yearly regressions are run for the years 1990-2007 and Fama-McBeth regressions t-values, adjusted for serial correlation using the Newey and West (1987) procedure, are reported below each coefficient. Avg R square is the average adjusted R square from Fama-McBeth yearly regression All continuous variables are winsorized at the top and bottom 1 percent. Variables are defined in appendix A. ***, **, * represent statistical significance at 0.01, 0.05 and 0.1 levels, respectively.

| | *Expected sign* | *One-period-ahead INDOPCASH* | | *Two-period-ahead INDOPCASH* | | *Three-period-ahead INDOPCASH* | |
|---|---|---|---|---|---|---|---|
| *INTERCEPT* | ? | -0.051 | -0.053 | -0.039 | -0.039 | -0.025 | -0.023 |
| | | (-3.39)*** | (-3.64)*** | (-2.78)** | (-2.74)** | (-1.57) | (-1.42) |
| *EINDEX* | ? | -0.002 | | -0.001 | | -0.001 | |
| | | (-2.66)** | | (-1.42) | | (-1.42) | |
| *HIEI_HIRD* | + | | 0.006 | | 0.009 | | 0.009 |
| | | | (2.32)** | | (3.07)*** | | (3.12)*** |
| *HIEI_LORD* | ? | | -0.007 | | -0.007 | | -0.010 |
| | | | (-1.72)* | | (-1.84)* | | (-2.40)** |
| *LOEI_LORD* | ? | | -0.002 | | -0.005 | | -0.008 |
| | | | (-1.03) | | (-1.43) | | (-2.00)* |
| *LOGMVAL* | + | 0.020 | 0.019 | 0.018 | 0.017 | 0.015 | 0.015 |
| | | (14.73)*** | (13.27)*** | (12.73)*** | (11.69)*** | (10.26)*** | (10.36)*** |
| *BTM* | - | -0.051 | -0.051 | -0.048 | -0.048 | -0.048 | -0.047 |
| | | (-3.13)*** | (-3.54)*** | (-3.39)*** | (-3.23)*** | (-3.69)*** | (-3.69)*** |
| *# of obs.* | | 19,589 | | 18,715 | | 17,877 | |
| *Avg. R square* | | 12.59% | 12.67% | 10.30% | 10.52% | 8.64% | 8.93% |

TABLE 5

*Takeover Defenses and Market-to-book Ratio*

This table reports the valuation effects of ATPs across the various groups. The dependent variable in column 3 is the ratio of the market value of common equity divided by the book value of common equity at the end of period t, less its median value for that industry (Fama-French 48 groups) and year ($INDMTB_t$). In column 4 the dependent variable is $INDMTB_{t+3}$ and column 5 examines the difference between $INDMTB_{t+3}$ and $INDMTB_t$. The control variables are *LOGASSET*, representing the log of total assets, *RND*, representing the ratio of research and development expenditures and net sales, *CAPEXP* is total capital expenditures divided by net sales, *ROA* is operating income after depreciation divided by total assets, *LCOMPAGE* is the log of company age (in years) and *DIVERSE* equals 1 if two or more SIC codes are reported for the firm; 0 otherwise. Regressions are estimated annually using data for 1990-207 and Fama-McBeth regression coefficients are reported for each regression. T-values reported below each coefficient are adjusted for serial correlation using the Newey and West (1987) procedure. Avg R square is the average adjusted R square from Fama-McBeth yearly regression. All continuous variables are winsorized at the top and bottom 1 percent. Variables are defined in appendix A. ***, **, * represent statistical significance at 0.01, 0.05 and 0.1 levels, respectively.

| | *Expected sign* | $INDMTB_t$ | $INDMTB_{t+3}$ | $INDMTB_{t+3}$ - $INDMTB_t$ |
|---|---|---|---|---|
| *INTERCEPT* | ? | -0.742 | -1.048 | 0.002 |
| | | (3.59)*** | (2.38)** | (0.00) |
| *HIEI_HIRD* | + | -0.116 | -0.012 | 0.122*** |
| | | (-2.04)* | (-0.200) | (2.08) |
| *HIEI_LORD* | ? | -0.653 | -0.668 | -0.021 |
| | | (-6.73)*** | (-12.900)*** | (-0.23) |
| *LOEI_LORD* | ? | -0.316 | -0.400 | -0.103** |
| | | (-4.42)*** | (-7.12)*** | (-1.91) |
| *LOGASSET* | + | 0.145 | 0.196 | 0.037 |
| | | (2.74)*** | (3.85)*** | (0.55) |
| *RND* | + | 5.131 | 2.914 | -2.035 |
| | | (2.50)** | (-2.38)*** | (-1.08) |
| *CAPEXP* | + | 1.376 | -0.057 | -1.216 |
| | | (2.36)** | (0.08) | (-1.70) |
| *ROA* | + | 11.417 | 5.794 | -6.858 |
| | | (15.71)*** | (13.01)*** | (-8.25)*** |
| $ROA_{t-1}$ | + | -0.047 | 2.110 | 2.104 |
| | | (-0.09) | (2.76)*** | (2.82)*** |
| *LCOMPAGE* | - | -0.167 | -0.013 | 0.145 |
| | | (-3.38)*** | (-0.360) | (2.17)** |
| *DIVERSE* | + | 0.110 | -0.112 | -0.179 |
| | | (1.35) | (-1.280) | (-2.41)*** |
| *# of obs* | | 20,488 | 17,877 | 17,877 |
| *Avg R square* | | 19.88% | 10.91% | 7.65% |

TABLE 6

*Takeover Defenses and R&D Efficiency*

This table presents the results of the effect of ATPs on the productivity of research and development expenditures. For this analysis we focus on a sub-sample of firms consisting of the HIEI_HIRD and HIEI_LORD groups. In order to examine the effects of past R&D expenditure, we capitalize past R&D expenditures assuming a 5-year life of these expenditures yielding RNDCAP = $RND_t + 0.8RND_{t-1} + 0.6RND_{t-2} + 0.4RND_{t-3} + 0.2RND_{t-4}$/TA. . Column 1 reports results based on one-period-ahead return on assets, column 2 reports results based on two-period-ahead return on assets and column 3 reports results based on three-period-ahead return on assets. Yearly regressions are run for the years 1990-2007 and Fama-McBeth regressions t-values, adjusted for serial correlation using the Newey and West (1987) procedure, tvalues are reported below each coefficient. All continuous variables are winsorized at the top and bottom 1 percent. Avg R square is the average adjusted R square from Fama-McBeth yearly regression Variables are defined in appendix A. ***, **, * represent statistical significance at 0.01, 0.05 and 0.1 levels, respectively.

| | *Expected sign* | *1* <br> *One-period-ahead INDAJROA* | *2* <br> *Two-period-ahead INDAJROA* | *3* <br> *Three-period-ahead INDAJROA* |
|---|---|---|---|---|
| *INTERCEPT* | ? | 0.044 | 0.034 | 0.033 |
| | | (1.34) | (0.99) | (1.34) |
| *HIEI_HIRD* | ? | -0.003 | -0.010 | 0.000 |
| | | (-0.78) | (0.30) | (0.99) |
| *RNDCAP* | ? | 0.039 | 0.031 | 0.057 |
| | | (0.30) | (2.26)** | (0.01)*** |
| *RNDCAP*HIEI_HIRD* | + | 0.148 | 0.149 | 0.143 |
| | | (4.62)*** | (4.56)*** | (4.96)*** |
| *BTM* | - | -0.124 | -0.11 | -0.1001 |
| | | (-6.41)*** | (-6.27)*** | (-6.19)*** |
| *LOGMVAL* | + | 0.021 | 0.020 | 0.019 |
| | | (13.08)*** | (12.16)*** | (11.57)*** |
| *LEV* | ? | -0.124 | -0.092 | -0.066 |
| | | (-4.79)*** | (-3.51)*** | (-2.71)*** |
| *CAPEX* | + | 0.419 | 0.027 | 0.003 |
| | | (0.39) | (0.26) | (0.89) |
| *LCOMPAGE* | - | -0.020 | -0.019 | -0.020 |
| | | (-4.54)*** | (-4.01)*** | (-3.79)*** |
| *# of obs.* | | 6,941 | 6,619 | 6,321 |
| *Avg R Square* | | 32% | 27% | 25% |