Institutional Investors and Corporate Investment

Kit Pong Wong
The University of Hong Kong

Long Yi*
Hong Kong Baptist University

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We investigate the impacts of institutional investors on corporate investment in this paper. Relying on the annual reconstitution of Russell 1000/2000 indexes that generates exogenous variations in institutional ownership, we find institutional investors induce firms to invest more. We further show the increase in investment is due to higher investment sensitivity to changes in investment opportunities. Contrary to the conventional wisdom, our findings suggest it is passive type institutional investors that are inducing the changes in investment. Moreover, the impact of institutional investors on corporate investment is more pronounced in a subsample of firms that have low equity dependence and high cash holdings, suggesting institutional investors discipline corporate investment through the corporate governance channel.

Keywords: Corporate Investment; Passive Institutional Ownership; Agency Problems; Corporate Governance; Regression Discontinuity Design.

* Correspondence author, Finance and Decision Sciences, School of Business, Hong Kong Baptist University, 34 Renfrew Road, Kowloon Tong, Hong Kong. Tel: +852-3411-6636, Fax: +852-3411-5588, e-mail: jasonyi@hkbu.edu.hk. We thank Jason Chao of Russell Investments for providing index membership data. We would also like to thank Brian Bushee for making institutional ownership type data available online.

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Abstract

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1. Introduction

Managerial myopic decisions induced by short-term pressure from the stock market are considered to be a first-order problem facing modern firms. Corporate investment decisions, critical to the future of a firm, are one of those decisions affected by the short-term pressure. In a recent paper by Asker, Farre-Mensa and Ljungqvist (2014), they document significant differences in investment behaviors between private firms and observably similar public firms utilizing a novel dataset of private U.S. firms. It is found that public firms' investments are substantially less responsive to changes in investment opportunities compared with those of private firms. The level of investment is also lower for public firms. This low sensitivity of investment to changes in investment opportunities and low level of investment of public firms are most likely caused by short-term pressure from shareholders, which distorts the investment behavior of public firms. As noted in Bushee (1998), there is a debate on whether institutional investors are the source of short-term pressure of the stock market. But institutional ownership is highly likely an endogenous variable. It is often not clear whether institutional investors induce

the changes in corporate decisions or they simply migrate to those firms with desired actions. This paper aims to study the link between institutional investors and corporate investment decisions utilizing a research discontinuity design.

Our identification strategy relies on the annual reconstitution of the Russell 1000/2000 indexes. Russell 1000 and 2000 indexes are value-weighted indexes constructed from the 3000 largest U.S. firms in terms of end of May market capitalization for each year (Figure 1). Firms ranked within the first 1000 consist of the Russell 1000 index and the rest 2000 firms the Russell 2000 index. Firms ranked equal or higher 1000, having higher market capitalization relative to the Russell 1000 threshold[1], are assigned to the Russell 1000 index while those ranked below 1000 will be assigned to the Russell 2000 index. Firms assigned to the bottom of the Russell 1000 index receive much lower index weighting than firms assigned to the top of the Russell 2000 index due to the value-weighting nature of the indexes. This lower index weighting generates variation in institutional ownership. These annual indexes reconstitution are unlikely to be correlated to a firm's investment decisions and therefore can be regarded as quasi-natural experiments to study the impact of institutional investors on corporate decisions.

[Insert Figure 1 Here]

Moreover, the past two decades have witnessed a major change in the constituents of institutional investors of public firms in the United States. The share of passive type institutional investors[2] has been growing steadily in the past two decades and now consists of the lion's share

[1] Determined by the end of May market capitalization of the 1000th firm.

[2] "…ETFs are only becoming more popular. In the first quarter of this year, they received net inflows of $96bn, 2.5 times more than the same time last year. Mutual funds experienced the highest level of net outflows in 2014 since 2007" according to Financial Times, 24, April 2015. We use the classification of Bushee (2001) to separate different types of institutional investors. Quasi-indexer type institutional investors are the passive institutional investors in this paper. We use quasi-indexer institutional investors and passive institutional investors interchangeably.

of total institutional ownership (Figure 2). The second question to be answered in this paper is the link of passive type institutional investors and corporate investment.

[Insert Figure 2 Here]

Previous studies of the impacts of institutional investors towards firms have by and large focused on active institutional investors or treated all institutional investors as a homogenous group. Much less attention has been given to passive type institutional investors. It is surprising given that passive institutional investors are a major player in the universe of institutional investors. Moreover, Identify the causal impact of institutional investors on firms decisions is not easy, disentangle the influence of passive type institutional investors is even harder.

Utilizing the annual reconstitution of Russell indexes, we find institutional ownership of firms assigned to the Russell 2000 index is more than 21.1% higher than that of firms assigned to the Russell 1000 index one quarter after the reconstitution within a bandwidth of 50 around the Russell 1000 threshold. Institutional investors are not born the same and index reconstitution should have distinct impact on the ownerships of different types of institutional investors. To find out which type of institutional investors is mostly affected, we classify institutional investors into three types: quasi-indexer, dedicated and transient type according to Bushee (2001). Out of a total of 21.1% discrepancy in total institutional ownership, 14.2% are due to changes in quasi-indexer type institutional ownership. These institutional investors include index funds as well as actively managed funds that mimic a particular index. These quasi-indexer institutional investors are the passive type institutional investors we focus on in this paper. This discontinuity in the ownership of total institutional ownership and quasi-indexer ownership around the Russell

1000/2000 indexes threshold provide us the opportunity to study the impacts of institutional investors, especially those passive type institutional investors, on investment decisions of firms.

One caveat with using Russell index reconstitution is that the indexes assignment is determined by end of May capitalization of firms, but index weight/ranking within an index is determined by end of June float-adjusted market capitalization[3]. The problem with using the June weighting/ranking is that those firms around the threshold might not be those around the threshold when assigning firms into indexes at the end of May because of float-adjustment. However, in this paper, we have to use the June weighting. As noted in Boone and White (2015), the June weight/ranking is the determinants of institutional ownership and that is why they opt to use the June weighting/ranking. Nonetheless, we do show there is no observable discontinuity in the assigning variable (market-capitalization) even if we use the June ranking. The firms differ in market capitalization by around 2% around the threshold. This means firms cannot precisely manipulate the assignment into the indexes. The regression discontinuity analysis is valid in this scenario (Lee and Lemieux (2010)).

We start our analysis with the comparison of investment levels of firms around Russell 1000 index threshold. There are observably large discontinuities in investment levels around the Russell 1000 threshold for corporate investment. Our regression discontinuity analysis on investment levels shows that firms that are assigned to the Russell 2000 index invests significantly more compared with similar firms that are assigned to the Russell 1000 index, indicating there is a real impact of institutional investors on corporate investment decisions. The treatment effect of inclusion into the Russell 2000 index on gross investment (growth in total

[3] Float-adjustment is to adjust the market capitalization by the tradable shares of the firm. If the firm has low portion of tradable shares, then its market capitalization will be reduced in the adjustment and vice versa. The float-adjustment is Russell's proprietary information and is not provided to us.

assets) is 5%, which is significant and economically large when considering the mean of gross investment is 13%. When we look at different elements of gross investment (Gross INV), we find a significant treatment effect for investment in research & development expenditures (RD) and acquisition expenses (AQ). The impact on capital expenditures (CAPX) is, however, insignificant. Overall, the results suggest higher institutional ownership causes firms to invest more, especially in RD and AQ.

The discrepancy in the levels of investment could reflect higher investment opportunities or higher investment sensitivity to investment opportunities. We proceed to show that the result is not driven by differences in investment opportunities for firms around the Russell indexes threshold. Specifically, to eliminate the impact of differences in investment opportunities, we perform a first stage regression of investment on investment opportunities for all Russell 1000/2000 firms. We then take the residual investment levels that are orthogonal to investment opportunities from the regression and perform regression discontinuity analysis using the residuals. Our result again reveals the existence of discontinuity around the Russell 1000 threshold, that the residual investments of firms are higher if the firm is included in the Russell 2000 index. These show the channel through which institutional investors influence firm investment is not by increasing investment opportunities of firms.

Overall, the regression discontinuity analysis reveals institutional investors induce firms to invest more, especially in RD and AQ. Since the difference in investment opportunities cannot account for the difference. The likely explanation is institutional investors increase the sensitivity of investment to changes in investment opportunities of firms. Moreover, since the Russell index reconstitution impacts passive type institutional investors the most, passive type institutional investors should play a key role in the results we document. We proceed to formally test our

hypotheses that 1) institutional investors increase investment through increasing firms' investment sensitivities; 2) it is passive institutional investors that induce firms to have investments that are more sensitive to changes in investment opportunities.

We cannot estimate investment sensitivity in a regression discontinuity context given the small sample size around the threshold. To test the hypotheses, we expand the data to include all U.S. firms. Using a large panel of U.S. public firms from 1982 to 2013[4], we find the investment of firms with high institutional ownership is much more responsive to changes in investment opportunities compared with that of firms with low institutional ownership. Gross investment sensitivity to investment opportunities is barely 0.280 for firms with low institutional ownership[5] while it increases to 0.516 for firms with high institutional ownership. Similar results obtained when we define investment as CAPX, RD and AQ.

The positive relationship found between institutional ownership and investment sensitivity to investment opportunities of firms suffers two concerns. First of all, there might be unobserved firm heterogeneity that is correlated with both institutional ownership and firm investment behavior. Secondly, the positive relationship might be due to reverse causality. If firms that have higher investment sensitivity attract more institutional investors, we could still observe the same results. To address these endogeneity concerns, we utilize instrumental variable (IV) for institutional ownership that are unlikely to be related to corporate investment decisions. The instrumental variable is constructed from the S&P 500 index membership. This instrumental variable has been used by Aghion, van Reenen and Zingales (2013) where they study the

[4] Our data on different types of institutional ownership starts from 1981 and are matched with corporate investment data a year later.

[5] In each year, we divide firms into three groups by their level of institutional ownership. Low institutional ownership refers to firms that have institutional ownership in the lowest tercile. High institutional ownership refers to firms with institutional ownership in the highest tercile.

relationship between institutional ownership and innovation of firms. Inclusion into the S&P index will likely to increase the ownership by institutional investors of a firm. This is because those institutional investors' performance is usually benchmarked against the index. However, it is very much unlikely that the inclusion into the S&P index will influence the investment behavior of firms. On average, institutional ownership of S&P 500 firms is 56%, substantially higher that of non-S&P 500 firms (32%). Using instrumental variable analysis, we reconfirm our result that firms with higher institutional ownership have investments more sensitive to changes in investment opportunities.

IV analysis also provides us the opportunity to disentangle the impact of passive institutional investors from other types of investors. Instead of using the total institutional ownership in the first stage IV analysis, we use institutional ownership by passive type institutional ownership in the first stage. The IV is also valid for passive type institutional investors as index inclusion influences these types of institutional investors the most. The results in the second stage are stronger than those when total institutional ownership is used in the first stage. Higher passive type institutional ownership is a strong predictor of high investment sensitivity. This confirms our hypothesis that passive type institutional investors are able to influence corporate investment decisions.

Next, we proceed to disentangle the channel through which passive type institutional investors exert their influence on firms. There are two likely channels through which institutional ownership could influence the investment sensitivity. The first one is the equity financing channel. Passive type institutional investors have price impact on firms (Chang, Hong and Liskovich (2015)). This price impact could translate into impact on investment for firms that depend on equity financing. Baker, Stein and Wurgler (2003) documents that the stock prices

influence the investment of equity dependence firms much more. The second likely channel is through corporate governance. Appel, Gormley and Keim (2015) documents passive type institutional investors can influence the governance mechanism of firms through their large voting blocs. They find ownership by passive type institutional investors is associated with better corporate governance. With better corporate governance mechanisms, firms can also exhibit higher investment sensitivity. Our results support the corporate governance channel and refute the equity financing channel by showing that the link between passive institutional ownership and investment sensitivity of firms are more pronounced for a subsample of firms with low equity dependence and high cash holdings.

Several robustness tests are offered in the end. First of all, instead of using the 1000^{th} firm as the threshold for Russell 1000/2000 indexes assignment, we use 950^{th} and 1050^{th} rank as the pseudo threshold ranks. As expected, when we move the threshold of Russell indexes threshold to the market capitalization of the 950^{th} or 1050^{th} firm, our discontinuity results are gone. Next, instead of focusing at investment sensitivity to investment opportunities and the level of investment, we follow the accounting literature to look at the unexplained investment from the investment regression (Richardson (2006); Biddle, Hilary and Verdi (2009)). Firms with agency issues are more likely to have higher level of unexplained investment. If institutional investors impact corporate investment through improving corporate governance, we would expect they also reduce unexplained investment. We take the residual from the investment regression on investment opportunities and other control variables. A positive residual is considered over-investment while a negative one indicates under-investment, both of which are deemed sub-optimal investment level. In this study, we take the absolute value of the residual and name it inefficient investment levels. Regressed them on (passive type) institutional ownership, we find a

negative significant coefficient on (passive type) institutional ownership in the IV 2SLS regression. These results are consistent with our previous finding that the presence of (passive type) institutional investors influences corporate investment through corporate governance.

Our results make several contributions to the literature. Primarily, we contribute to the debate on whether institutional investors are in a position to solve short-termism issues of corporate America or they exacerbate the problem, especially passive type institutional investors. Using firms around Russell 1000/2000 indexes and a large panel of U.S. public firms, we find that institutional investors increase corporate investment and improve the efficiency of corporate investment through increasing investment sensitivity. Bushee (1998) studies the impact of institutional investors on RD investment. His finding is similar to ours. He documents that transient institutional investors encourage myopic RD investment of firms and other types of institutional investors reduce myopic investment behavior. However, our findings rely on regression discontinuity design and instrumental variable analysis, which solve the endogeneity problem in his paper. Moreover, his paper focuses on RD investment. Ours look at a broader set of corporate investment. Chen, Harford and Li (2007) study the impact of institutional investors on acquisition. They find concentrated holdings by independent long investment horizon institutional investors are related to post-merger performance. The mechanism of their finding is the monitoring of institutional investors. A related paper by Gaspar, Massa and Matos (2005), also in the context of merges and acquisitions, show that target firms with short investment horizon institutional investors are more likely to get bid but do not get high premiums. This is due to weak monitoring from short investment horizon shareholders. This paper, however, focuses on passives institutional investors, who influence firms through their voting blocs.

Secondly, our results contribute to the recent literature on passive institutional investors. With the growing popularity of index funds and the benchmark of funds' performance on indexes, passive type institutional investors have become a dominant force in the world of institutional investors. Most previous researches of institutional investors have by and large focused on active institutional investors. Few have studied the impacts of passive institutional investors. Appel, Gormley and Keim (2015) document passive institutional investors are able to improve corporate governance of firms through their large voting blocs. Boone and While (2015) find higher ownership by passive institutional investors increases managerial disclosure, analyst following and liquidity which result in lower information asymmetry. Our paper focuses on the real implications of this improvement in corporate governance and reduction in information asymmetry. An important contribution of ours is to show there are real impacts of passive type institutional investors on corporate investment decisions.

Finally, our results contribute to the corporate investment literature. There is a large literature on the impacts of agency problems on corporate investment (See Stein (2003) for a review). Asker, Farre-Mensa and Ljungqvist (2014) documents a significant discrepancy in investment sensitivity as well as investment levels between private and public firms and concludes that public listing status creates agency problems that lead to short-term focus of firms. Ladika and Sautner (2014), using a quasi-natural experiment, show that management with more short-term incentives reduces the investment of the firm. Edmans, Fang and Lewellen (2014) link the CEO's concerns for short-term stock price to reductions in real investment by looking at equity vesting. We offer a solution to the sub-optimal investment problem induced by agency problem in this paper.

The remainder of the paper is organized as follows. Section 2 describes the data sources and descriptive statistics. Section 3 presents the results of regression discontinuity design using annual Russell 1000/2000 indexes reconstitution. Section 4 presents results using S&P 500 membership as instrument for (passive type) institutional ownership. Section 5 discusses the likely mechanism on how passive type institutional investors exert their influence on firms. Several robustness tests are discussed in Section 6. Section 7 concludes.

2. Data and Descriptive Statistics

2.1 Data for Regression Discontinuity Design

Russell Investments provides us with company name of index constituents, ticker symbol of each company and the end of June index weighting/ranking of the Russell 1000/2000 indexes for a period from 1984 to 2006. After which Russell introduces the banding rule[6] that reduces local continuity for of firm assignment around the threshold. We obtain corresponding market capitalization data of firms from CRSP and accounting data from COMPUSTAT. We drop entries (about 1% the data) with no match in CRSP or multiple matches where we cannot identify the validity of the match. Including these entries will not change the results. We obtain institutional ownership data from Thompson Reuters. Thompson Reuters collects equity ownership data of institutional investors from 13-F filings. Institutional investment manager with investment discretion over 100 million or more is required to file form 13-F with the SEC within 45 days at the end of a calendar quarter on the number of shares they hold of firms. It includes investment advisers, banks, insurance companies, broker-dealers, pension funds etc.

[6] See Appendix A for details

Classifications of institutional investors are obtained from Brian Bushee's personal website[7]. Financial firms with SIC code within 6000 and 6999 and firms with missing investment information are excluded from the analysis. Unbounded ratio variables have been winsorized at 1% level to eliminate the impact of outliers. We obtain a total for 49,053 firm-year observation for non-missing total investment measure. 6,308 firm-year observations are within the 200 bandwidth around the 1000th threshold of the Russell indexes.

2.2 Data for Instrumental Variable Analysis

For instrumental variable analysis, we obtain S&P 500 index information from CRSP. To be included in the sample, a firm has to have no missing information about investment, be located in the United States and not in the financial industry. Accounting information from COMPSUTAT for 1982 to 2013 is matched with institutional ownership from Thompson Reuters for 1981 to 2012. Unbounded ratio variables have been winsorized at 1% level to eliminate the impact of outliers. Firm-year observations with institutional ownership over one[8] are also dropped. Firms with missing information for investment/investment opportunities are excluded from the analysis. We have a total of 111,536 firm-year observation left in our baseline regression with non-missing gross investment measure. Detailed definition of variable construction can be obtained from Appendix B.

2.3 Measures of Institutional Investors

Our measure of institutional investors is the percentage of institutional ownership. It is widely used in the literature, for example by Hartzell and Starks (2003) on the relationship

[7] http://acct.wharton.upenn.edu/faculty/bushee/IIclass.html. We would like to thank Brian Bushee who makes the data available online.
[8] This could be the result of data errors. Including those firms or replace institutional ownership over one to one will not influence our results.

between institutional investors and executive compensation, Aghion, van Reenen and Zingales (2013) on institutional investors and innovation. It is calculated as the ratio of total common stocks held by 13-F institutional investors and total shares outstanding.

Institutional investors differ in their investment styles. The classification we utilize is from Bushee (2001) where he classifies institutional investors into three types: transient institutional investors (INV_TRA), dedicated investors (INV_DED) as well as quasi-indexers (INV_QIX). Quasi-indexers are the focus of this paper. They are buy-and-hold passive type institutional investors. Transient investors have high turnover and exhibit the use of momentum strategies while dedicated type institutional investors have low turnover and have little sensitivity to current earnings.

2.4 Measures of Corporate Investment

Our definition of investment follows from Chen, Goldstein and Jiang (2007). We first define gross investment (Gross INV) as the change total assets scaled by begin-of-the-year total asset. This investment definition not only captures the traditional investment measure--capital expenditure, it also captures mergers and acquisitions (M&A) activities. M&A is also an important form of investment of the firm. Various studies on institutional investors and corporate investors have shown that institutional investors are related with corporate M&A decisions, for example Chen, Harford and Li (2007) document institutional investors influence acquisition decisions of firms. Therefore, it is important to include M&A into the total calculation of investment. Our results, however, do not hinge upon this specific definition of investment. We also use individual measures of investment as robustness tests. These include capital expenditure (CAPX), research & development expenditures (RD) and acquisition activities (AQ).

2.5 Measure of Investment Opportunities

We use sales growth (Q) as the measure for investment opportunities throughout this paper. Sales growth has been widely used as the proxy for investment opportunities (Lehn and Poulsen (1989), Shin and Stulz (1998), Bloom, Bond and van Reenen (2007), Michaely and Roberts (2012) and Asker, Farre-Mensa and Ljunqvist (2014)). We opt to not use market-to-book ratio as the proxy for investment opportunities as literature documents investment sensitivity to market-to-book ratio captures the amount of information the managers of a firm learns from the stock market (Chen, Goldstein and Jiang (2006)). As the information of institutional investors is mostly known by managers, the manager learns more from the trading of individual investors. Therefore, from the information point of view, investment sensitivity to market-to-book ratio should be lower for firms with higher institutional ownership. For the purpose of this paper, we use sales growth as the measure of investment opportunities to separate us from the information literature.

2.6 Other Firm Characteristics

Our main control variables for investment regression include ROA, Cash Flow and Leverage. Although investment opportunity alone (Q) should fully explain investment, prior research have documented the impact of ROA, Cash Flow and Leverage (Asker, Farre-Mensa and Ljunqvist (2014), Kaplan and Zingales (1997) and Ahn, Denis and Denis (2006)) on firm investment.

2.7 Descriptive Statistics

Table 1 shows the summary statistics of the main variables used in the paper. On average, firm investment is 13% of last year's total assets when investment is measured as changes in total assets. The average capital expenditure is 7% of lagged total assets. Research and

development expenses on average are 5% of lagged total assets while acquisition expenses are about 3% of lagged total assets. Total institutional ownership is 32% on average, with the majority comes from passive institutional investors (QIX type). Detailed definition of variables can be obtained from Appendix B.

[Insert Table 1 Here]

2.8 Institutional Ownership and Corporate Investment: A First Glance

To get a first glimpse on the impact of institutional ownership on corporate investment, we divide our whole sample into three groups by their level of institutional ownership. Table 2 summaries the patterns in investment for these three groups of firms. Firms with highest institutional ownership (H IOR) invest more than firms with lowest institutional ownership (L IOR) do except for RD. Controlling for differences in investment opportunities (Q), the effects become more evident. Gross INV, CAPX and AQ increases monotonically with the level of institutional ownership. RD, however, decreases when institutional ownership is higher. The difference of Gross INV of firms with high institutional ownership and low institutional ownership is 3% of lagged total assets. Compared with a mean level of 13%, the impact of institutional investors on the level of investment is economically large.

[Insert Table 2 Here]

Mean comparison, however, ignores other firm features that are associated with investment. Firms with higher institutional ownership invests more could be the results of institutional investors migrate towards firms with features that are associated with high level of investment. In another word, the differences in the levels of investment might not be induced by institutional investors.

To identify the link between institutional ownership and corporate investment, in what follows, we cater to regression discontinuity design utilizing the annual Russell 1000/2000 indexes reconstitution.

3. Empirical Results: A Regression Discontinuity Design

3.1 Russell 1000/2000 Indexes

Russell Investments constructs the Russell 1000 and 2000 indexes based on transparent rules. The indexes are constructed objectively by market capitalization of firms. Each year starting from 1984, Russell Investments calculats the total market capitalization of U.S. firms on the last trading date of May. Firms ranked within 1 to 1000 will be included in the Russell 1000 index; the next 2000 firms (1001 to 3000) constitute the Russell 2000 index. Except for certain corporate events[9], firms remain in the index for the whole year. Firms do not know the precise threshold value of 1000^{th} firm before the reconstitution and therefore cannot manipulate to be included in the Russell 1000 or 2000 indexes precisely. The two indexes are value-weighted. After assigning firms into the indexes, Russell Investments determines the weight of firms in their respective indexes by their float-adjusted market capitalizations. Float-adjusted market capitalization excludes the corporate shares that are not available for purchase and are not part of the investable opportunity set. The amount of float adjustment is the proprietary information of Russell Investments. As the rank/weight information we get is after float-adjusting, one may question the validity of the regression discontinuity design as firms around the threshold using June's adjusted ranking might be not those firms around the threshold using May's ranking.

[9] See Appendix A for details

However, we show in Figure 3 that even use the ranking of June, there is no observable discontinuity in the assignment variable (End of May market capitalization).

[Insert Figure 3 Here]

Figure 4 shows that firms ranked just above the 1000 threshold receive a much lower weight than firms ranked just below 1000 do due to the fact that firms are larger in the Russell 1000 index. Distance is the difference of the market capitalization ranking of the firm and 1000. Distance is therefore negative for firms in the Russell 1000 index and positive for firms in the Russell 2000 index. On average, the 50 firms ranked above 1000 threshold have an index weight of 0.08% while the 50 firms ranked below 1000 threshold and are therefore in the Russell 2000 index have an index weight of 0.165%, which are more than 20 times higher. This discontinuity in index weighting will generate discontinuity in institutional ownership, especially those passive institutional investors whose investment portfolio closely mimics the index. Even institutional investors mimic Russell 1000 index may choose to ignore firms at the bottom of the index due to transaction costs of trading those stocks (Frino and Gallagher (2001)). We formally show the discontinuity in institutional ownership next.

[Insert Figure 4 Here]

3.2 Discontinuity in Institutional Ownership

Panel A of Table 3 presents the mean differences in quarterly institutional ownership for Russell 1000/2000 firms around the 1000 threshold. One quarter after Russell reconstitution (September), total institutional ownership are much higher for firms that are assigned to the top of Russell 2000 index than firms that are assigned to the bottom of Russell 1000 index. With a bandwidth of 50, average total institutional ownership is 58.2% for top Russell 2000 firms, while

it is only 37.1% for bottom Russell 1000 firms. The discrepancy in institutional ownership narrows when we enlarge the bandwidth. But even if we choose a bandwidth of 200, there is still 8% difference in total institutional ownership for the two groups of firms below and above the Russell 1000/2000 threshold. The difference in institutional ownership lasts not just for the immediate quarter but for the whole year as can be seen the total institutional ownership discrepancy persists for the following quarters.

As for different types of institutional ownership, we find that out of the 21.1% total difference institutional ownership, 14.2% difference is due to quasi-indexers. For dedicated type institutional investors, the difference is not significant. Transient institutional investors also exhibit some preferences towards Russell 2000 firms, but in a much lesser degree compared with quasi-indexer type institutional investors.

[Insert Table 3 Here]

Figure 5 presents the visual inspection of the discontinuity in institutional ownership around the 1000 threshold. The dot represents the mean of institutional ownership within 10 evenly spaced bins for a bandwidth of 200. The lines are 4^{th} order global polynomials fitted for the control (Russell 1000 firms) and those treated (Russell 2000 firms) for a fixed bandwidth of 200. Sub-figure (a) is for total institutional ownership and (b) to (d) are for different types of institutional investors. The discontinuity of institutional investors is obvious and mostly the result of discontinuity in ownership by quasi-indexer type institutional investors.

[Insert Figure 5 Here]

Panel B presents the regression discontinuity design treatment effects of inclusion into the Russell 2000 index on total institutional ownership. We used the bias-corrected treatment effects

proposed by Calonico, Cattaneo, and Titiunik (2014a). We use the rule of thumb bandwidth as well as two fixed bandwidths of 100 and 200. The treatment effect of Russell 2000 inclusion is an increase of 26.9% in total institutional ownership for the next quarter. The treatment effect remains strong for the whole year. Also, the results are not driven by specific bandwidth selection. The treatment effect is statistically significant for rule of thumb bandwidth as well as for the two fixed bandwidths.

Panel C reports the treatment effect for institutional ownership by types of institutional investors. The treatment effect is the largest for passive type (quasi-indexer) institutional investors. The treatment effect for the next quarter passive type institutional ownership is an increase of 18.8%. The treatment effect is insignificant for ownership by dedicated type institutional investors. For transient type institutional investors, the treatment effect is statistically significant as well, but the magnitude is only less than half of that for passive type institutional investors.

Overall, through mean comparison, visual inspection and RDD estimation, we confirm the existence of discontinuity in institutional ownership around the 1000^{th} threshold and the discontinuity is the largest for passive type institutional investors.

3.3 The Effect of Institutional Ownership on Corporate Investment

This section explores the investment of firms around the Russell 1000/2000 indexes threshold. If (passive type) institutional investors do have impacts on corporate investment, we expect corporate investment should exhibit discontinuity around the threshold due to the discontinuity in institutional ownership.

Firms with low and high institutional ownership could differ in many other unobserved factors. In our regression discontinuity setting, however, we can solve the endogeneity problem as assigning into Russell 1000/2000 indexes can be regarded as quasi-natural experiment that changes the level of institutional ownership, but not other unobserved factors that influence investment. By comparing the investment patters of firms around the threshold, we can identify the link between institutional ownership and investment.

Figure 6 presents the regression discontinuity plot for Gross INV, CAPX, RD and AQ respectively. The results are different from what we find when we compare investment of firms by their level of institutional ownerships in the previous section. This is why controlling for endogeneity is important. We note that Gross INV, RD and AQ are all higher for firms to the right of the threshold (with higher institutional ownership). But CAPX is lower for firms to the right of the threshold. We next test the statistically significance of the difference using mean comparison and regression discontinuity treatment effect estimation.

[Insert Figure 6 Here]

Panel A of Table 4 displays the mean differences of the investment for the two groups of firms. It confirms the discontinuity we observed in Figure 6. Firms that are assigned to the Russell 2000 indexes have higher Gross INV, RD and AQ compared with that of firms which are assigned to the Russell 1000 index. The differences in CAPX, however, are insignificant. These indicate higher institutional ownership is associated with higher Gross INV, RD and AQ.

Panel B of Table 4 displays the regression discontinuity design treatment effects for investments. The results are similar to what we find in mean comparisons. The treatment effect of inclusion into Russell 2000 index is 5% increase in Gross INV, 1.7% increase in RD and 1.3%

increase in AQ when the rule of thumb bandwidth is used. This is economically large considering the averages of Gross INV, RD and AQ is 13%, 5%, 1.3% respectively. The results are generally robust to the two fixed bandwidth we used.

[Insert Table 4 Here]

Discontinuity in investment could be the result of discontinuity in investment opportunities. Figure 7 displays the investment opportunity (Q) of the two groups of firms. There is no observable discontinuity in Q around the threshold. Thus, the level of Q alone should not be able to account for the differences in investment levels. To formally address the concern of the differences in Q for the two groups of firms, we perform the following investment regression to control for the impact of Q:

$$I_{it} = \alpha + \beta Q_{it} + + \epsilon_{it} \quad (1)$$

We take the residuals of this investment regression and compare the residuals of investments for firms around the Russell threshold.

[Insert Figure 7 Here]

If differences in Q can explain the discontinuity in investment levels, we would expect the discontinuity disappears or narrows once we control for the impact of Q. However, visual inspection reveals the opposite. Figure 8 displays the regression discontinuity plot for the residual investments. We can observe the discontinuity in investment levels remains even if we control for Q.

[Insert Figure 8 Here]

Panel A of Table 5 compares the differences in mean of investments for firms around the Russell threshold using fixed bandwidth of 50, 100 and 200. Irrespective of the bandwidth chosen, we find firms in the Russell 2000 (higher institutional ownership) invest more in terms of Gross INV, RD and AQ. The differences are statistically significant and economically large. For example, the increase in Gross INV is 4.2%. Considering the mean of Gross INV is only 13%, this 4.2% is an economically large increase in the level of Gross INV. The discontinuity is smaller in magnitude compared with that when we use unconditional investment levels. This indicates differences in Q can partially explain the discontinuity in Gross INV, but are not the whole story given the remaining discrepancy of 4.2% is still economically large. For RD and AQ, the discontinuity remains the same magnitude, suggesting differences in Q cannot account for the discontinuity.

Panel B reveals the bias-corrected regression discontinuity treatment effect. The results are similar to what we find by comparing the sample means. The treatment effect is a significant increase in Gross INV, RD and AQ irrespective of the bandwidth chosen. The change in the magnitude of the treatment effect compared with that of unconditional investments is also minimal. Assigning to the Russell 2000 will increase Gross INV by 3.7%, RD by 1.6% and AQ by 1.2% as of the lagged total assets. There are no significant differences in the level of CAPX however.

[Insert Table 5 Here]

All these results indicate differences in Q cannot account for the differences in the investment level induced by changes in institutional ownership. Investments increase either because of an increase in Q or because of a higher investment sensitivity to the same Q. Our

findings up to now reveal the likely channel through which institutional investors induces firms invest more is through increasing investment sensitivity to Q. We left the formal testing of this hypothesis for the next section.

4. Empirical Results: Instrumental Variable Analysis

Our regression discontinuity analysis reveals the causal link between institutional ownership and corporate investment. However, it cannot direct test the link between institutional ownership and corporate investment sensitivity and it cannot direct identity the impact of passive type institutional investors although Russell 1000/2000 index reconstitution mainly affect passive type institutional investors. This section therefore aims to study 1) the link between institutional ownership and investment sensitivity; 2) the role of passive type institutional investors.

4.1 Comparison of Investment Sensitivity: A First Glance

As with the level of investment, we start with a first glance at investment sensitivity of firms that differ in institutional ownership. Firms are classified into three groups: L IOR, M IOR and H IOR by their level of institutional ownership, with firms in L IOR group have the lowest institutional ownership. Investment sensitivity is estimated from the following equation:

$$I_{it} = \alpha + \beta Q_{it} + \mu_i + \eta_t + \epsilon_{it} \tag{2}$$

where β measures investment sensitivity. μ_i and η_t are firm and time-fixed effects, respectively.

Table 6 displays the results. From Columns 1 to 3, we can see the sensitivity of Gross INV to Q is 0.280 for firms in the L IOR group. It increases to 0.348 for firms in the M IOR group. For firms with the highest institutional ownership, the investment sensitivity is also the highest at

0.516. The difference in investment sensitivity is significant as revealed in Column 4 that the interaction of term of Q and IOR is positively significant. Investment is defined as CAPX in Columns 5 to 8, RD in Columns 9 to 12 and AQ in Columns 13 to 16. The results are similar to those when investment is defined as Gross INV, higher institutional ownership is associated with higher investment sensitivity.

[Insert Table 6 Here]

4.2 The Impact of Institutional Ownership on Investment Sensitivity

Institutional ownership is an endogenous variable in regressions. Reverse causality could stem from the selection of institutional investors. The literature has documented an inclination of institutional investors to hold better governed firms (Ferreira and Matos (2008); Chung and Zhang (2011)). Better governed firm suffers less agency problems. Therefore, any relationship found could be the results of institutional investors migrate towards firms with less myopic investment instead of inducing the changes. Moreover, there could be unobserved firm characteristics that correlate with both institutional ownership and corporate investment. We cater to instrumental variable (IV) to address these endogenity problems of institutional ownership in this section.

We use S&P 500 membership as the basis to construct the instrumental variable. Our instrumental variable is a dummy variable that equals one if the firm is a constituent of S&P 500 index. This instrumental variable has been widely used in the literature for institutional ownership, for example by Aghion, van Reenen and Zingales (2013) to study the impact of institutional investors on firm innovation. Firms in the S&P 500 index have higher institutional ownership as the performances of many institutional investors are measured against this index,

which biases institutional investors' portfolio towards firms in the S&P 500 index. Moreover, there are many institutional funds that directly mimic S&P 500 index. However, S&P 500 membership status should not be correlated with firm performance or corporate investment decisions. Out of our sample of 111,536 firm-year observations, 10,343 firm-year observations are in the S&P 500 index with an average institutional ownership of 56%. Institutional investors own 32% of the rest of the firm-year observations on average. We use the two-stage least square instrumental variable regression (2SLS IV) to estimate the impact of institutional investors, the second stage equation is:

$$I_{it} = \alpha + \beta_1 Q_{it} + \beta_2 Q_{it} * \widehat{IOR_{it}} + \beta_3 \widehat{IOR_{it}} + Controls + \mu_i + \eta_t + \epsilon_{it} \quad (3)$$

where $\widehat{IOR_{it}}$ is estimated institutional ownership in the first-stage of the regression.

Table 7 presents the second stage regression results[10]. The 2SLS IV results are similar to what we find in the OLS regressions, β_2 is positive and significant when investment is defined as Gross INV, CAPX or AQ, but insignificant for RD investment. Controlling for ROA, cash flow and leverage, the results are stronger. β_2 are significant and are economically large. In Column 5, an interquartile increase in institutional ownership increases investment sensitivity from 0.268 to 0.465, an increase of more than 70% for Gross INV. Similar magnitude of increasing in investment sensitivity can be observed for CAPX, RD and AQ in Columns 6 to 8.

[Insert Table 7 Here]

4.3 The Role of Passive Type of Institutional Investors

[10] First stage results are reported in Appendix C. S&P 500 membership dummy has significantly positive coefficient in the first-stage regression where institutional ownership is the dependent variable.

Instrumental variable analysis offers us the chance to disentangle the impact of different types of institutional investors. Instead of using total institutional ownership to run the 2SLS IV test using equation (3), we replace total institutional ownership (IOR) by the ownership by passive type institutional investors (IOR_QIX).

Table 8 presents the results for the impact of passive type institutional investors on corporate investment. We find stronger coefficients on the interaction term, β_2 , compared with those when we use total institutional ownership to perform the analysis. This suggests passive institutional investors might be the driving force behind the impact we document[11]. No matter how we define investment, the coefficient on the interaction term between IOR_QIX (ownership by passive type institutional investors) and Q is positively significant. These indicate passive institutional investors have real impacts on corporate investment by increasing the investment sensitivity of firms.

[Insert Table 8 Here]

5. Equity Financing Channel or Corporate Governance Channel?

This section aims to identify the mechanism behind the link between institutional ownership and investment sensitivity. We propose two likely channels to explain the positive link between institutional ownership and investment sensitivity: equity financing channel and corporate governance channel.

As is documented in Baker, Stein and Wurgler (2003), the investment of equity dependent firms are a lot more sensitive to stock prices changes than those are not equity dependent. Equity

[11] In an unreported test, we find the impacts of transient institutional investors on corporate investment are much weaker. The IV we used is insignificant for dedicated type institutional investors in the first stage.

dependent firms are those who need external equity to finance their marginal investments. Passive type institutional investors, obviously, have price impact on firms (Chang, Hong and Liskovich (2015). The increase in price encourages investment when the firm needs issuing equity to finance investment. Therefore, the first likely channel through which passive type institutional investors exert influence on corporate investment is the equity financing channel.

On the other hand, Appel, Gormley and Keim (2015) documents passive type institutional investors can influence the governance mechanism of firms through their large voting blocs. The improvement in corporate governance could reduce managerial myopic decisions and increase investment sensitivity of firms.

In order to test which of these two channels is a work, we first separate firms by their levels of equity dependence to test these two likely channels. First of all, if passive type institutional investors influence corporate investment through equity financing channel, then we would expect the impact should be stronger towards firms that depend on equity financing more. We then separate firms by cash holdings to test the corporate governance channel. If passive type institutional investors influence corporate investment by reducing agency issues, we would expect the impact should be stronger towards firms that are more likely to engage in agency issue induced myopic investment decisions. Firms that are abundant with cash are more likely to engage in these activities. Therefore, we would expect firms that have more cash holdings are more affected by institutional investors if the corporate governance channel is at work.

5.1 Equity Financing Channel: Sorting by Equity Dependence

Baker, Stein and Wurgler (2003) construct a KZ4 index as the measure of equity dependence. This KZ4 index is calculated as a weighted sum of cash flow (*CF*), cash dividends (*DIV*), cash balances (*C*) and leverage (*LEV*):

$$KZ4 = -1.002\frac{CF_{it}}{A_{it-1}} - 39.368\frac{DIV_{it}}{A_{it-1}} - 1.315\frac{C_{it}}{A_{it-1}} + 3.139LEV_{it} \quad (4)$$

Firms with higher KZ4 are more constraint to equity financing, making the investment of firms more sensitive to stock prices. We separate firms into three groups by their levels of KZ4 index. Specifically, we assign firm-year observations into three groups each year by KZ4 indexes. Table 9 reports the regression results for firms with lowest KZ4 and highest KZ4.

[Insert Table 9 Here]

Columns 1, 3, 5 and 7 are for subsamples with low KZ4 indexes while Columns 2, 4, 6 and 8 are results of subsample of firms with high KZ4 index. It is obvious from the results that the impacts of passive type institutional investors are more pronounced for firms with high KZ4 index. Passive type institutional investors have no impact on investment sensitivity for subsamples of firms with high KZ4 indexes. This indicates the impact of passive institutional investors concentrated on firms that are not equity dependence, which refutes the equity financing channel.

5.2 Corporate Governance Channel: Sorting by Cash Holdings

Firms with more cash holdings are more prone to myopic investment decisions. To test whether passive type institutional investors influence corporate investment through alleviating agency problems, we separate firms into three groups by their level of cash holdings. We run

regression using equation (3) for firms with lowest level of cash holdings and those with highest holdings. Table 10 reports the regression results.

[Insert Table 10 Here]

Passive type institutional investors have significant impact on corporate investment for a subsample of firms with large amount of cash holdings as shown in Columns 2, 4, 6 and 8. The impact is much smaller for firms with low cash holdings. Actually, the coefficients on the interaction term between ownership by passive institutional investors and investment opportunities, a measure of the impact of institutional investors on firms, are insignificant in three out of the four columns. It is only significant when investment is defined as Gross INV, but the magnitude is much smaller (0.250 vs. 1.311). This is in line with what we expect if passive type institutional investors influence corporate investment through the corporate governance channel.

Overall, we find the impact of passive type institutional investors on corporate investment is most pronounced toward firms that are not equity dependent and have large pile of cash on hand. The reason passive institutional investors increasing investment sensitivity for these firms are unlikely due to equity financing channel. It is most likely through the channel of corporate governance.

6. Robustness Tests

6.1 Pseudo Russell 1000/2000 Threshold Ranks

Instead of using 1000 as the threshold rank to be assigned to Russell 1000 index, we check the robustness of our results by using pseudo threshold ranks in this section. Specifically, we

perform our regression discontinuity analysis of Russell 1000/2000 indexes reconstitution using 950/1050 ranks as the threshold rank as opposed to using the real threshold. If the increase in investment is truly driven by the increase in institutional ownership generated by index assignment, we would expect the results to go away if we change the threshold from 1000 to either 950 or 1050.

[Insert Figure 9 Here]

Panel A and Panel B of Figure 9 plot the institutional ownership around the pseudo threshold 950 and 1050 respectively. We no longer have the sharp discontinuity in institutional ownership when we use the pseudo threshold as opposed to the real threshold.

Table 11 reports the treatment effect for investment using pseudo threshold. In Panel A, where the 950^{th} ranked firm is used as the threshold, the treatment effects are almost gone. There is barely any significance in the treatment effects across different definitions of investment. In Panel B, we only observe slightly significant treatment effects when investment is defined as Gross INV and AQ. However, the treatment effects are negative. This is in fact due to the high investment of firms around the real threshold.

[Insert Table 11 Here]

These results confirm the validity of our finding using the Russell 1000/2000 threshold to identify the impact of institutional investors on corporate investment. The findings are not due to coincidence or pure luck.

6.2 Inefficient Investment

Low investment sensitivity to changes in investment opportunities captures one dimension of distorted investment decisions due to short-termism. As a robustness check, this section borrows from the literature that uses the portion of investment that cannot be explained by investment opportunities as inefficient investment of firms (Richardson (2006); Biddle, Hilary and Verdi (2009)). Specifically, in the first stage, we estimate equation (2) for the whole sample, take the absolute value of the residual from the regression and label it as inefficient investment. This inefficient investment captures both over- and under-investment of firms due to various agency issues. In the second stage, we relate this measure of inefficient investment to ownership by total institutional ownership and passive type institutional ownership. If (passive type) institutional investors influence corporate investment through the corporate governance channel, we would expect they are also in a position to reduce the level of inefficient investment.

Panel A of Table 12 presents the first stage results. Investment opportunities as well as other control variables are quite significant in explaining the level of investment. We take the residual from this regression and use the absolute value for the second stage regression. Panel B presents the second stage results. Columns 1 to 4 reveals institutional investors can indeed reduce inefficient investment levels. As with our previous results, when we use the ownership by passive institutional investors in Columns 5 to 8, we get stronger coefficient, suggesting passive type institutional investors are influencing corporate investment.

[Insert Table 12 Here]

The results in this section confirm our previous finding that (passive type) institutional investors influence corporate investment through corporate governance channel by looking at

another dimension of corporate investment. Thus, our findings are not driven by the specific dimension of corporate investment we study.

7. Conclusion

The focusing on short-term profits as opposed to long-run values of listed firms is a big concern for public firms. Literature documents this short-term focus makes public firms have low investment sensitivity to changes in investment opportunities and invest less. In this paper, it is found that firms with higher institutional ownership make investment decisions more sensitive to changes in investment opportunities. Higher institutional ownership is also associated with more investment. The causality of the relationship is established by using a regression discontinuity design as well as the use of instrumental variable analysis. These suggest institutional investors can alleviate distortions equity markets have on corporate investment.

Most importantly, we find passive type institutional investors are influencing firms in a good way. Although they are passive in their trading strategies, they are not passive in influencing corporate decisions. In terms of corporate investment decisions, we find firms with higher passive type institutional ownership also exhibit higher investment sensitivity to changes in investment opportunities. The likely channel through which these passive type institutional investors influencing corporate investment is the corporate governance channel. There are abundant researches on active institutional investors, for example on hedge funds. However, these passive type institutional investors are becoming the major players in the universe of institutional investors and are still gaining popularity nowadays. Their influences on firms merit further research.

Appendix A **Russell 1000/2000 Index Reconstitution**

Russell 1000 and 2000 indexes are market capitalization-weighted indexes constructed by Russell Investments from the year of 1984. The two indexes are objectively constructed and based on transparent rules. The two indexes contain the 3000 largest U.S. firms. Russell Investments ranks all exchange-traded U.S. firms based on their market capitalization on the last trading day of May each year. Firms ranked within the first 1000 consist of the Russell 1000 index and the rest 2000 firms the Russell 2000 index. Total market capitalization is determined by multiplying total outstanding shares by the market price as the last trading day in May. Common stock, non-restricted exchangeable shares and partnership units/membership interests are used to calculate a company's total market capitalization.

After membership is determined, securities shares are adjusted to include those shares available to the public. This is called "free float". The purpose of float-adjustment is to exclude portions of the firm that are not available for purchase. The price to calculate float-adjusted market capitalization is from the last trading day of June. The weight of the index is determined by the float-adjusted market capitalization.

Except for certain corporate actions, firms remain in the index until the next reconstitution. These actions include merges and acquisitions, and other activities influencing shares outstanding.

Since 2007, Russell investments introduces the banding rule that a firm in the Russell has to have a market capitalization larger/smaller than 2.5% than that of the new 1000^{th} threshold firm to merit a change in index. This weakens local continuity condition for regression discontinuity studies and we therefore end the sample on 2006.

Appendix B **Variable Definitions**

Gross Investment (Gross INV) is the change in total assets (AT) scaled by beginning-of-year total assets (AT)

CAPX is capital expenditure (CAPX) scaled by beginning-of-year total assets (AT).

RD is research and development (XRD, replace by 0 if missing) scaled by beginning-of-year total assets (AT).

AQ is the acquisitions expenses (AQC) scaled by beginning-of-year total assets (AT).

Q is sales growth. It is the change in sales (SALE) scaled by beginning-of-year sales (SALE).

ROA is operating income before depreciation (OIBDP) scaled by beginning-of-year total assets (AT).

CF is cash flow (IB+DP) scaled by beginning-of-year total assets (AT).

LEV is the sum of long-term (DLTT) and short-term debt (DLC) scaled by beginning-of-year total assets (AT).

IOR is the percentage of common shares held by institutional investors. It is calculated as the ratio of quarterly common shares held by institutions that file form 13-F and common shares outstanding. The quarterly data is then averaged to obtain yearly institutional ownership.

IOR_QIX is the percentage of common shares held by passive quasi-indexer (Type QIX) institutional investors in Bushee (2001).

IOR_DED is the percentage of common shares held by dedicated (Type DED) institutional investors in Bushee (2001).

IOR_TRA is the percentage of common shares held by transient (Type TRA) institutional investors in Bushee (2001).

INDEX is a dummy variable that equals 1in a certain year if the firm is in the S&P 500 index that year.

KZ4 index is calculated as a weighted sum of cash flow (CF), cash dividends (DIV), cash balances (C) and leverage (LEV):

$$KZ4 = -1.002\frac{CF_{it}}{A_{it-1}} - 39.368\frac{DIV_{it}}{A_{it-1}} - 1.315\frac{C_{it}}{A_{it-1}} + 3.139LEV_{it}$$

where CF is net income before extraordinary items (IB) plus depreciation and amortization (DP) plus R&D expenses scaled by beginning-of-year total assets (AT). DIV is the sum of dividends (DVC+DVP) scaled by beginning-of-year total assets (AT). C is cash balances (CHE) scaled by beginning-of-year total assets (AT). LEV is the leverage ratio calculated as the ratio of total debts (DLTT+DLC) and book value of the firm (DLTT+DLC+SEQ).

CASH is cash and short-term investments (CHE) scaled by total assets (AT).

Appendix C **First-Stage Regression Results in 2SLS IV Analysis**

Table A.1 **First-Stage Results for Table 7**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent	IOR	IOR	IOR	IOR	IOR	IOR	IOR	IOR
	Gross INV	CAPX	RD	AQ	Gross INV	CAPX	RD	AQ
Q	-0.003***	-0.003***	-0.003***	-0.003***	-0.005***	-0.005***	-0.005***	-0.005***
	(0.004)	(0.005)	(0.004)	(0.006)	(0.000)	(0.000)	(0.000)	(0.000)
*Q*Index*	0.044***	0.044***	0.044***	0.048***	0.040***	0.041***	0.040***	0.045***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Index	0.048***	0.048***	0.048***	0.050***	0.049***	0.049***	0.049***	0.051***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ROA					0.061***	0.061***	0.061***	0.061***
					(0.000)	(0.000)	(0.000)	(0.000)
CF					-0.015**	-0.015**	-0.015**	-0.015**
					(0.020)	(0.023)	(0.020)	(0.025)
LEV					-0.019***	-0.019***	-0.019***	-0.018***
					(0.000)	(0.000)	(0.000)	(0.000)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	108,826	107,657	108,826	103,391	108,230	107,165	108,230	102,898
Adjusted R^2	0.344	0.344	0.344	0.335	0.347	0.346	0.347	0.338

Table A.1 (Continued)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent	Q*IOR	Q*IOR	Q*IOR	Q*IOR	Q*IOR	Q*IOR	Q*IOR	Q*IOR
	Gross INV	CAPX	RD	AQ	Gross INV	CAPX	RD	AQ
Q	0.202***	0.203***	0.202***	0.206***	0.196***	0.197***	0.196***	0.199***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
*Q*Index*	0.332***	0.325***	0.332***	0.325***	0.325***	0.319***	0.325***	0.319***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Index	-0.018***	-0.017***	-0.018***	-0.016***	-0.017***	-0.017***	-0.017***	-0.015***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ROA					0.096***	0.095***	0.096***	0.090***
					(0.000)	(0.000)	(0.000)	(0.000)
CF					-0.024***	-0.023***	-0.024***	-0.020***
					(0.002)	(0.002)	(0.002)	(0.008)
LEV					0.009**	0.009**	0.009**	0.011***
					(0.027)	(0.022)	(0.027)	(0.005)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	108,826	107,657	108,826	103,391	108,230	107,165	108,230	102,898
Adjusted R^2	0.374	0.374	0.374	0.374	0.378	0.378	0.378	0.378

Table A.2 **First-Stage Results for Table 8**

	(1)	(2)	(3)	(4)
Dependent	IOR_QIX	IOR_QIX	IOR_QIX	IOR_QIX
	Gross INV	CAPX	RD	AQ
Q	-0.006***	-0.005***	-0.006***	-0.005***
	(0.000)	(0.000)	(0.000)	(0.000)
*Q*Index*	0.005	0.004	0.005	0.005
	(0.336)	(0.474)	(0.336)	(0.367)
Index	0.064***	0.065***	0.064***	0.065***
	(0.000)	(0.000)	(0.000)	(0.000)
ROA	0.000	0.000	0.000	0.000
	(0.939)	(0.965)	(0.939)	(0.979)
CF	-0.005	-0.005	-0.005	-0.006
	(0.190)	(0.211)	(0.190)	(0.194)
LEV	-0.010***	-0.010***	-0.010***	-0.010***
	(0.000)	(0.000)	(0.000)	(0.000)
Year Fixed Effects	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes
Observations	108,230	107,165	108,230	102,898
Adjusted R^2	0.319	0.318	0.319	0.308

	(1)	(2)	(3)	(4)
Dependent	Q*IOR_QIX	Q*IOR_QIX	Q*IOR_QIX	Q*IOR_QIX
	Gross INV	CAPX	RD	AQ
Q	0.105***	0.106***	0.105***	0.107***
	(0.000)	(0.000)	(0.000)	(0.000)
*Q*Index*	0.229***	0.228***	0.229***	0.225***
	(0.000)	(0.000)	(0.000)	(0.000)
Index	-0.009***	-0.009***	-0.009***	-0.008***
	(0.000)	(0.000)	(0.000)	(0.000)
ROA	0.050***	0.049***	0.050***	0.048***
	(0.000)	(0.000)	(0.000)	(0.000)
CF	-0.011***	-0.011***	-0.011***	-0.010**
	(0.007)	(0.009)	(0.007)	(0.020)
LEV	0.010***	0.010***	0.010***	0.011***
	(0.000)	(0.000)	(0.000)	(0.000)
Year Fixed Effects	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes
Observations	108,230	107,165	108,230	102,898
Adjusted R^2	0.368	0.368	0.368	0.366

Figure 1 **End of May Market Capitalization around the Russell 1000/2000 Threshold**

This figure displays the end of May market capitalization of firms around Russell 1000/2000 index threshold for the years 1984 to 2006. Market capitalization is calculated using data from CRSP. It could be different from Russell Investment's proprietary data. Distance is the relative position to the 1000th firm in the Russell 1000/2000 index.

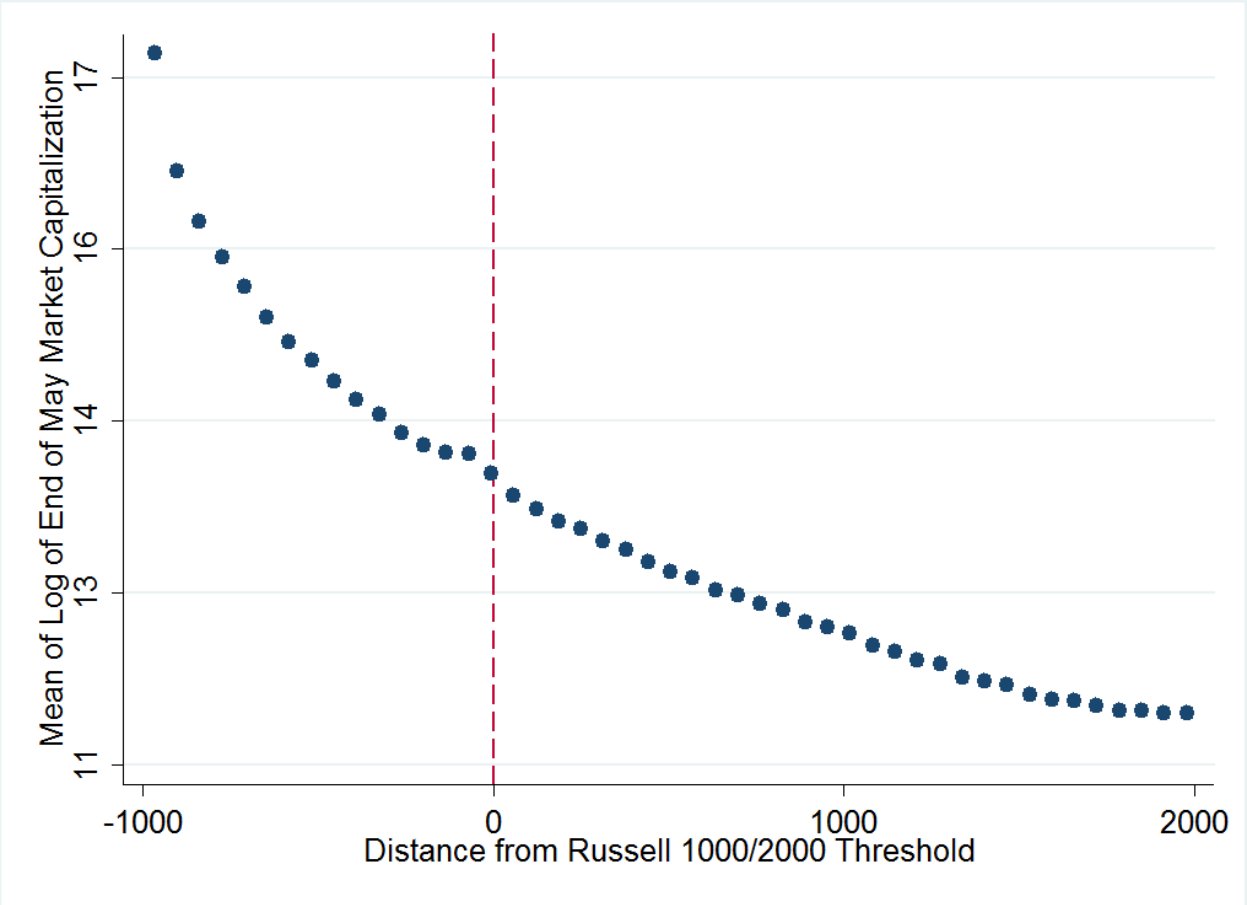
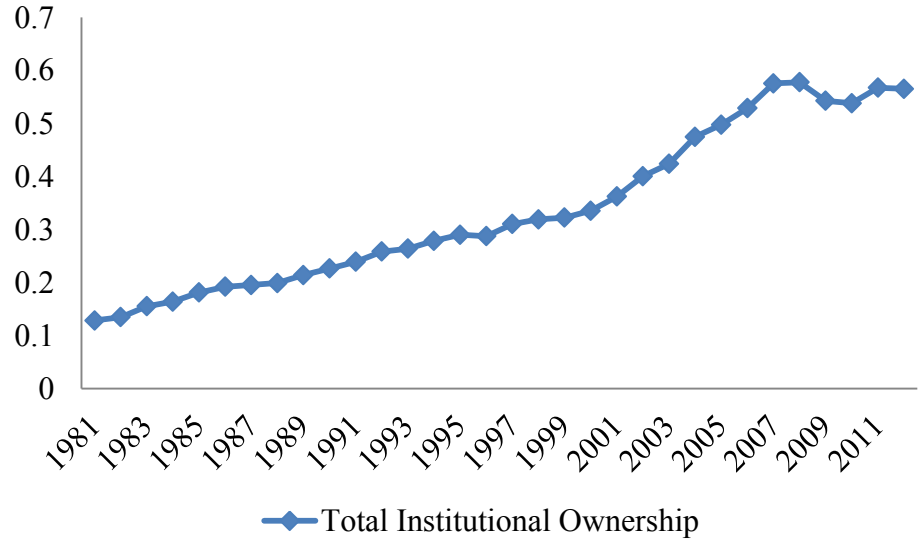


Figure 2 **Institutional Ownership across the Years**

Panel A **Total Institutional Ownership**

The figure shows the yearly average institutional ownership of firms from 1981 to 2012. It is calculated from 13-F files data obtained from Thompson Reuters. For each firm, institutional ownership is the ratio of common shares held by institutional investors that files form 13-F to total common shares outstanding.



Panel B **Institutional Ownership by Type**

The figure shows the yearly average institutional ownership of firms from 1981 to 2012. It is calculated from 13-F files data obtained from Thompson Reuters. For each firm, institutional ownership is the ratio of common shares held by institutional investors that files form 13-F to total common shares outstanding. Types of institutional investors are from Bushee (2001).

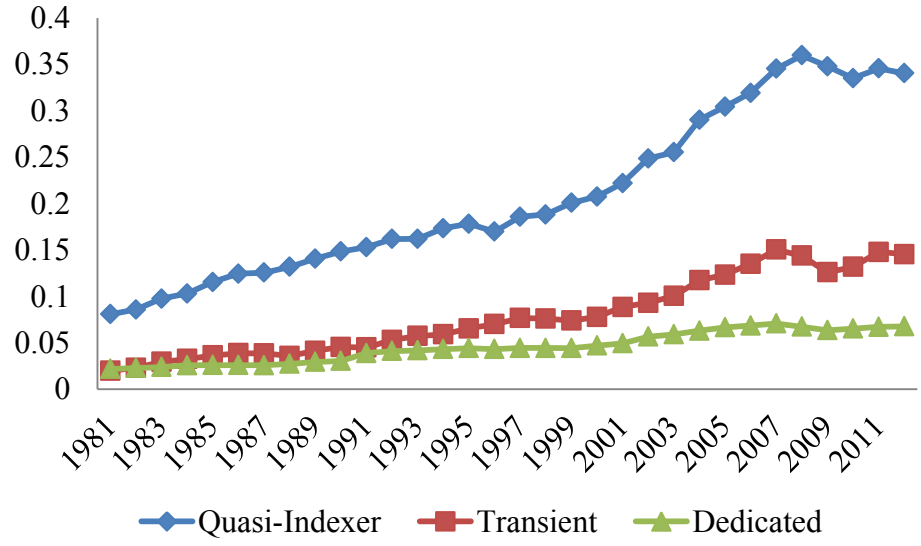


Figure 3 **End of May Market Capitalization around the Russell 1000/2000 Threshold**

This figure displays the end of May market capitalization of firms around Russell 1000/2000 index threshold for the years 1984 to 2006. Market capitalization is calculated using data from CRSP. It could be different from Russell Investment's proprietary data. Distance is the relative position to the 1000th firm in the Russell 1000/2000 index. The dots in the figure represents sample mean of 10 non-pverlapping bins on each side of the threshold. The lines represent a fourth-order polynomial fit.

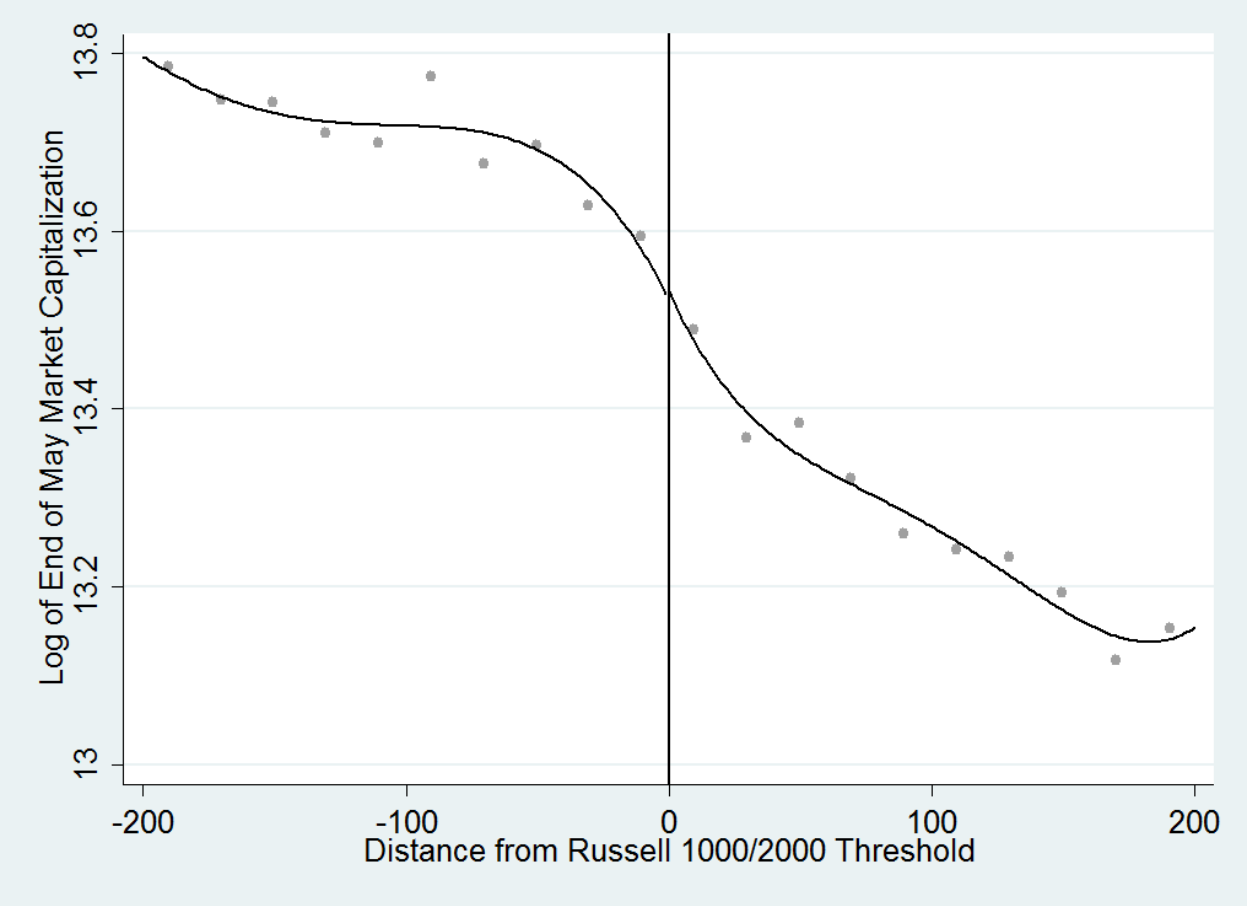


Figure 4 **End of June Index Weights around the Russell 1000/2000 Threshold**

This figure displays the index weights of firms around Russell 1000/2000 index threshold for the years 1996 to 2006. The data is provided by Russell Investment. Distance is the relative position to the 1000th firm in the Russell 1000/2000 index. The dots in the figure represents sample mean of 10 non-pverlapping bins on each side of the threshold. The lines represent a fourth-order polynomial fit.

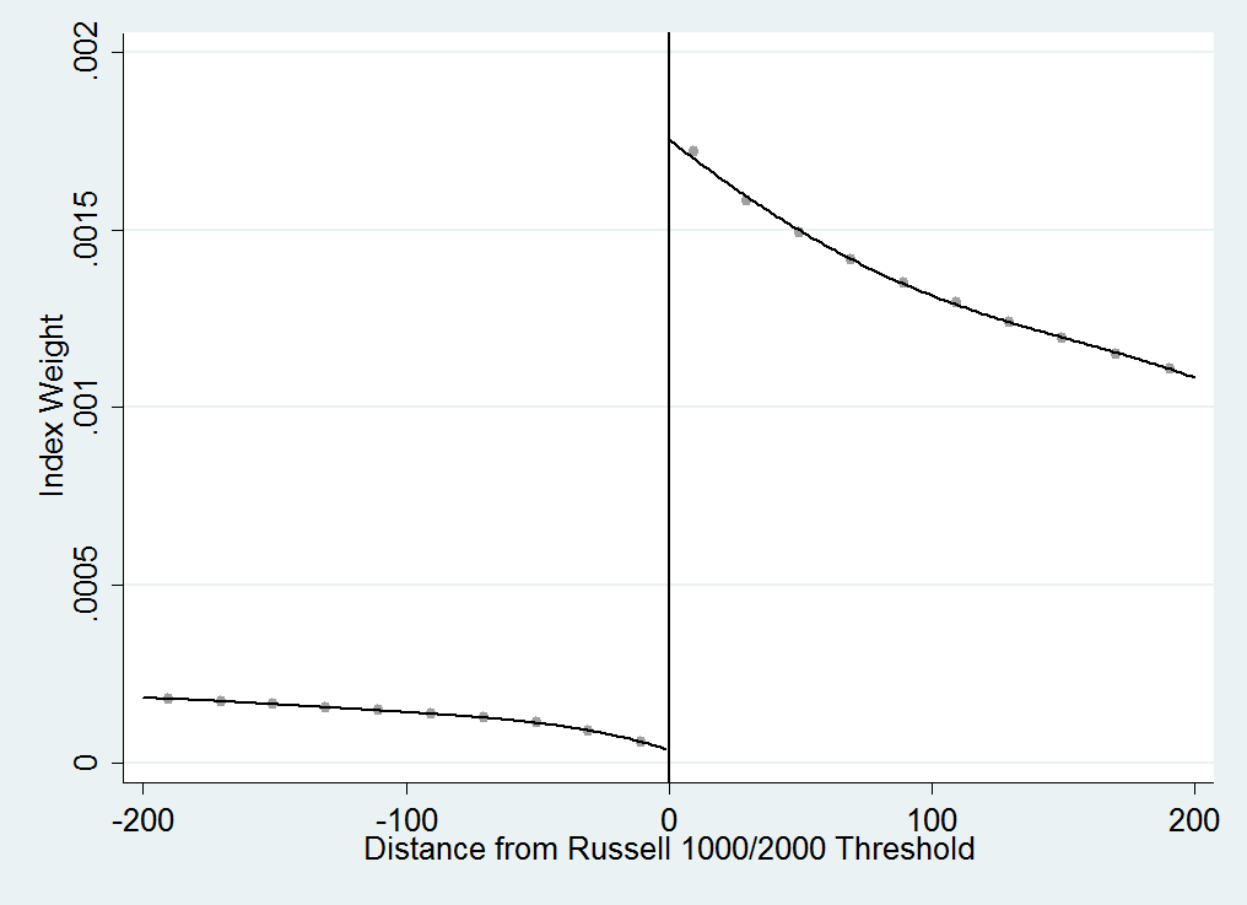
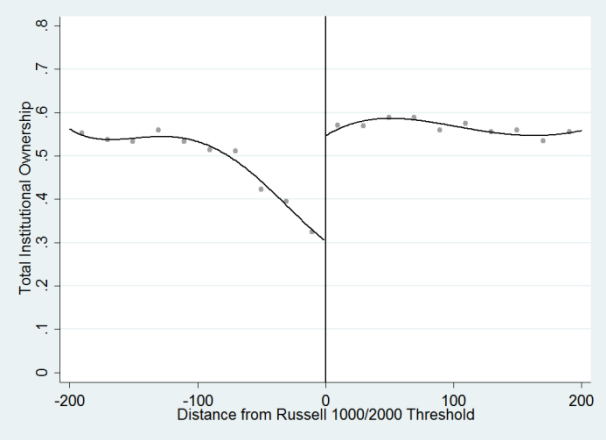


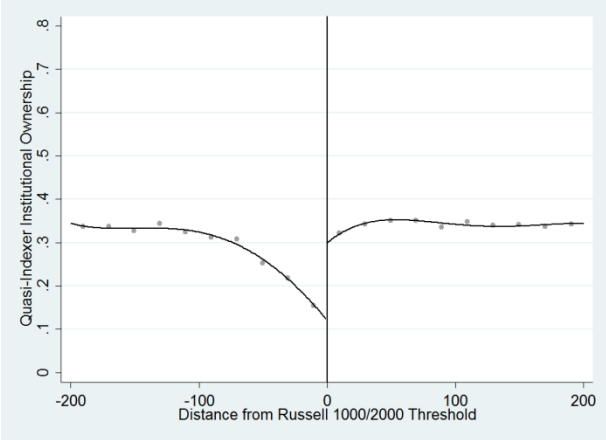
Figure 5 **Institutional Ownership around the Russell 1000/2000 Threshold**

These figures display institutional ownership of firms around Russell 1000/2000 index threshold for the years 1996 to 2006. Russell index data is provided by Russell Investment. Institutional ownership is calculated from 13-F filings data from Thompson Reuters. Institutional investors are classified in to Quasi-Indexer, Dedicated and Transient type according to Bushee (2001). Distance is the relative position to the 1000th firm in the Russell 1000/2000 index. The dots in the figure represents sample mean of non-pverlapping bins on each side of the threshold. The lines represent a fourth-order polynomial fit.

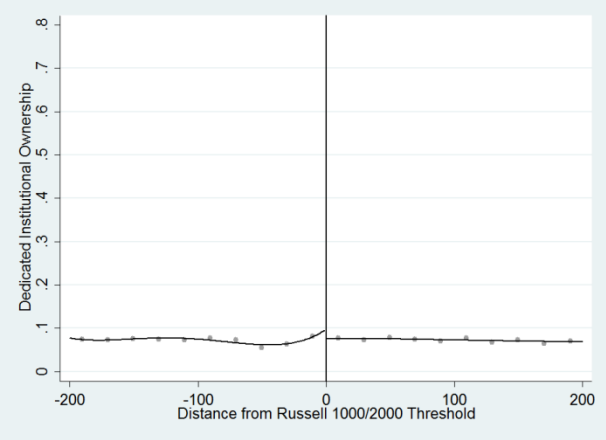
(a) Total Institutional Ownership



(b) Quasi-Indexer



(c) Dedicated



(d) Transient

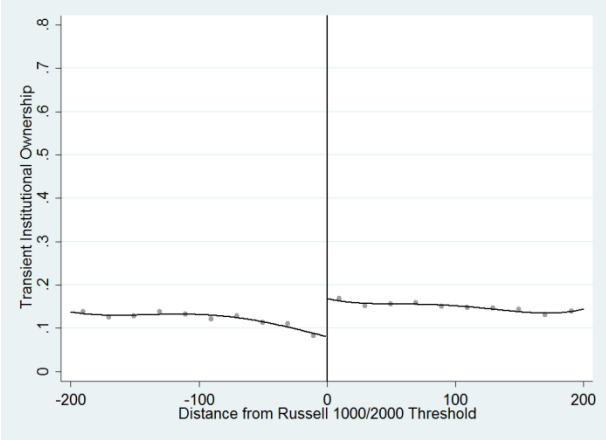
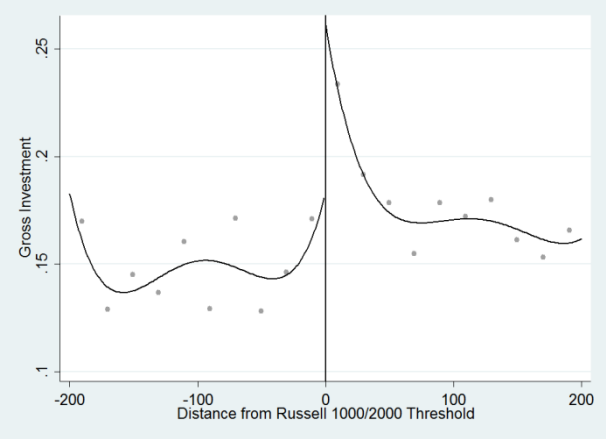


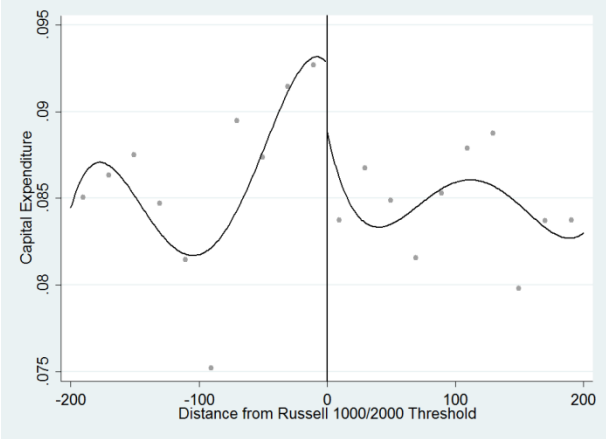
Figure 6 **Investments around the Russell 1000/2000 Threshold**

These figures display investment of firms around Russell 1000/2000 index threshold for the years 1996 to 2006. Russell index data is provided by Russell Investment. Investment is calculated from COMPUSTAT. Detailed definitions of investment can be found in Appendix A. Distance is the relative position to the 1000th firm in the Russell 1000/2000 index. The dots in the figure represents sample mean of 10 non-pverlapping bins on each side of the threshold. The lines represent a fourth-order polynomial fit.

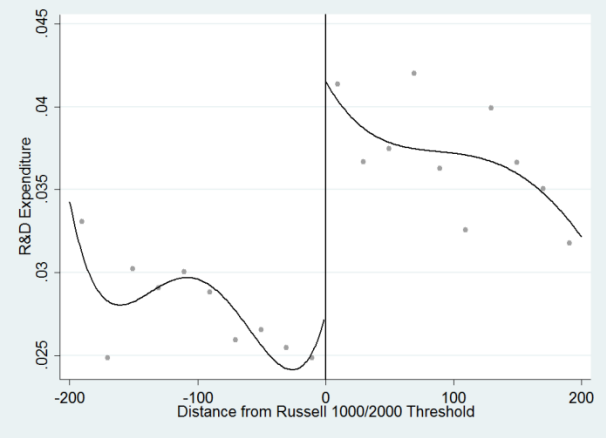
(a) Gross Investment



(b) Capital Expenditures



(c) Research & Development



(d) Aquistions

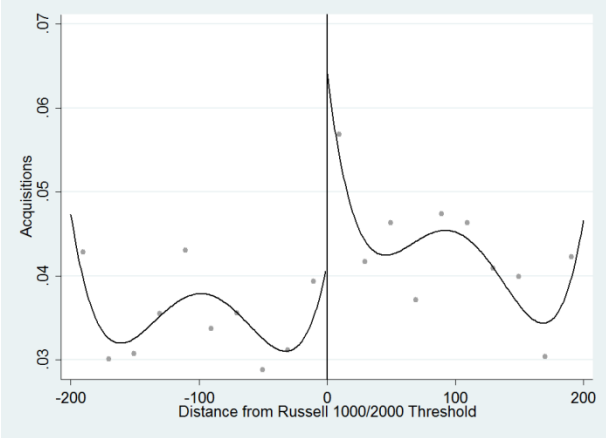


Figure 7 **Investment Opportunities around the Russell 1000/2000 Threshold**

This figure displays investment opportunities of firms around Russell 1000/2000 index threshold for the years 1996 to 2006. Russell index data is provided by Russell Investment. Investment opportunities are calculated from COMPUSTAT. Detailed definitions of investment opportunities can be found in Appendix A. Distance is the relative position to the 1000th firm in the Russell 1000/2000 index. The dots in the figure represents sample mean of 10 non-pverlapping bins on each side of the threshold. The lines represent a fourth-order polynomial fit.

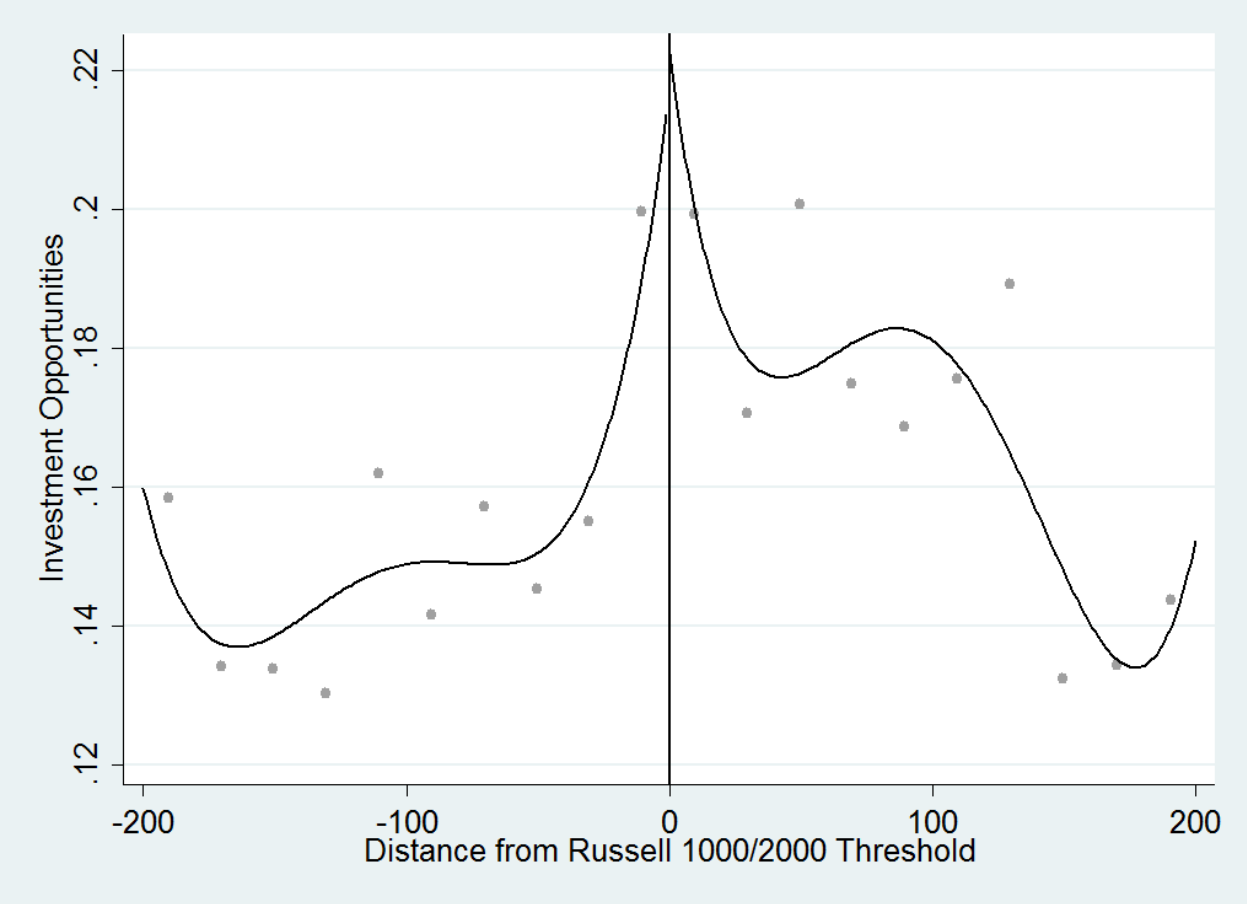
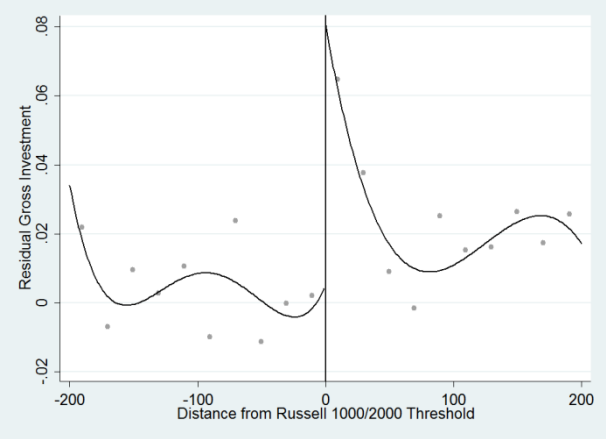


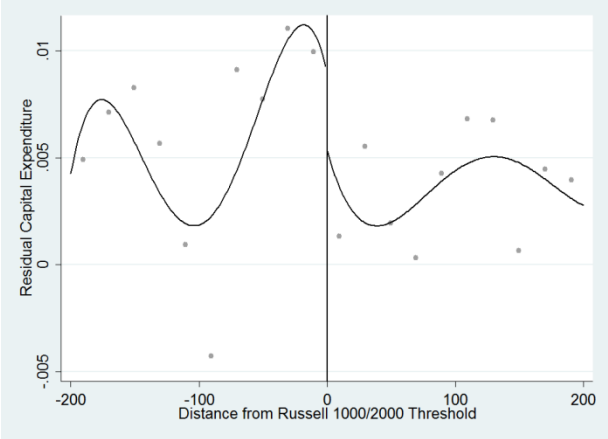
Figure 8 **Residual Investments around the Russell 1000/2000 Threshold**

These figures display residual investment of firms around Russell 1000/2000 index threshold for the years 1996 to 2006. Russell index data is provided by Russell Investment. Residual Investment is calculated from COMPUSTAT. Detailed definitions of residual investment can be found in Appendix A. Distance is the relative position to the 1000^{th} firm in the Russell 1000/2000 index. The dots in the figure represents sample mean of 10 non-pverlapping bins on each side of the threshold. The lines represent a fourth-order polynomial fit.

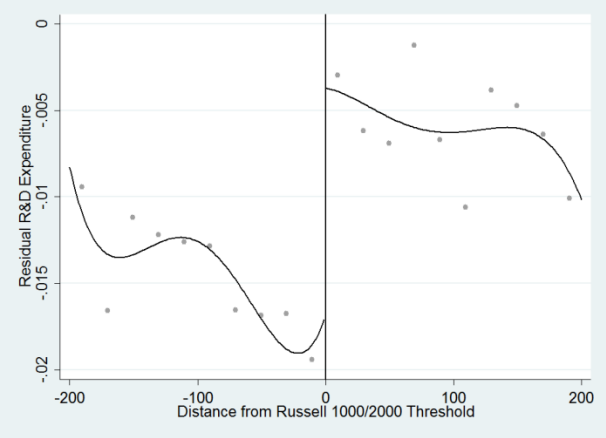
(a) Gross Investment



(b) Capital Expenditures



(c) Research & Development



(d) Aquistions

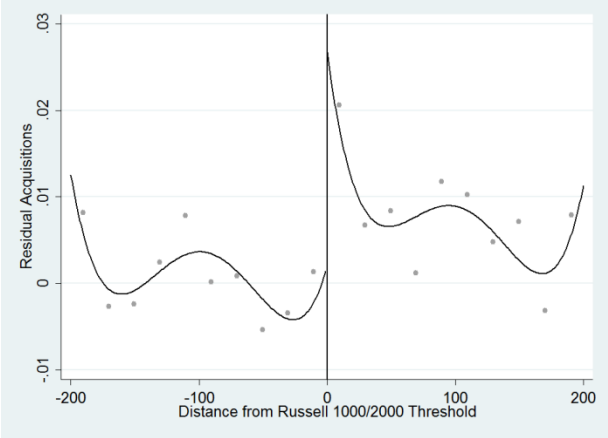
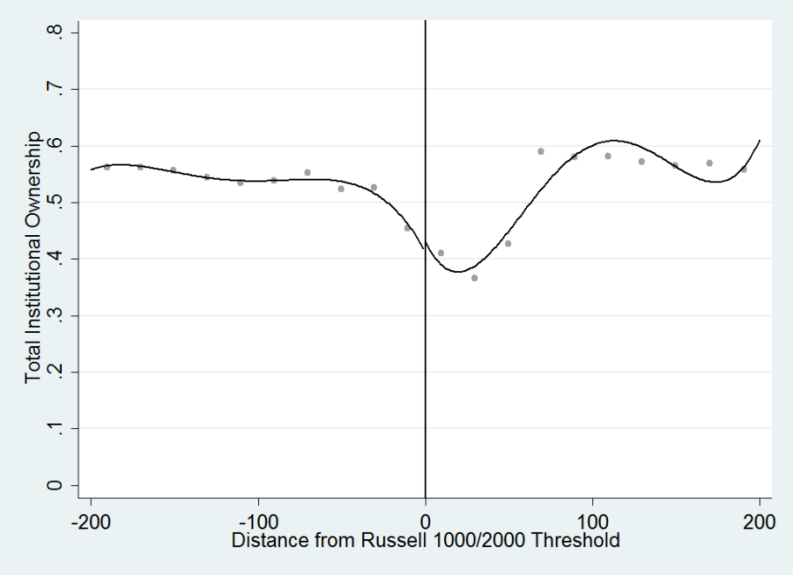


Figure 9 **Institutional Ownership around Pseudo Russell 1000/2000 Threshold**

These figures display institutional ownership of firms around Pseudo Russell 1000/2000 index threshold for the years 1996 to 2006. Russell index data is provided by Russell Investment. Institutional ownership is calculated from 13-F filings data from Thompson Reuters. Distance is the relative position to the 950th firm in the Russell 1000/2000 index in (a). Distance is the relative position to the 1050th firm in the Russell 1000/2000 index in (b). The dots in the figure represents sample mean of non-pverlapping bins on each side of the threshold. The lines represent a fourth-order polynomial fit.

(a) 950th Rank as the Pseudo Threshold



(b) 1050th Rank as the Pseudo Threshold

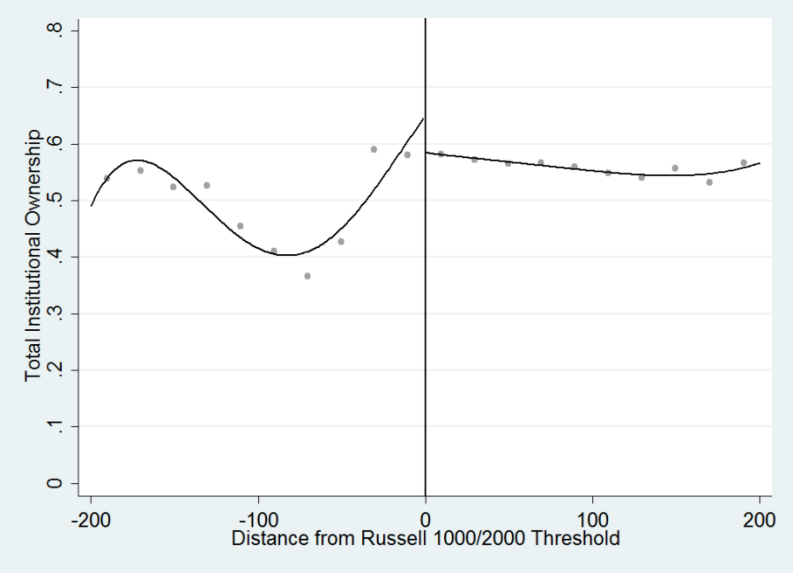


Table 1 **Descriptive Statistics**

This table presents descriptive statistics for the whole sample of firms. Institutional ownership data is from Thompson Reuters and stretches from 1981 to 2012. We merge yearly institutional ownership data with corporate data. Corporate data from calendar year 1982 to 2013 is obtained from COMPUSTAT. Unbounded ratio variables have been winsorized at 1% level to minimize the impact of outliers. A detailed definition of variables can be obtained from Appendix B.

Variable	N	Mean	S.D.	Min	0.25	Mdn	0.75	Max
Investment								
Gross INV	111536	0.13	0.41	-0.59	-0.05	0.05	0.18	2.41
CAPX	110231	0.07	0.09	0.00	0.02	0.05	0.09	0.51
RD	111536	0.05	0.11	0.00	0.00	0.00	0.05	0.63
AQ	105997	0.03	0.09	0.00	0.00	0.00	0.00	0.62
Investment Opportunities								
Q	110227	0.15	0.48	-0.77	-0.03	0.08	0.22	3.09
Firm Characteristic								
ROA	111188	0.08	0.22	-0.99	0.03	0.12	0.19	0.53
CF	111177	0.03	0.22	-1.09	0.00	0.08	0.13	0.42
LEV	111133	0.27	0.27	0.00	0.05	0.22	0.40	1.42
Institutional Ownership								
IOR	125751	0.32	0.28	0.00	0.07	0.25	0.53	1.00
IOR_QIX	125751	0.20	0.18	0.00	0.03	0.14	0.33	0.94
IOR_DED	125751	0.04	0.07	0.00	0.00	0.01	0.06	0.89
IO_TRA	125751	0.08	0.09	0.00	0.00	0.04	0.12	0.90

Table 2 **Investment Levels of Firms: By Institutional Ownership**

This table presents descriptive statistics of corporate investment for firms with low, medium and high institutional ownership respectively. Institutional ownership groups each year by the level of institutional ownership. Unbounded ratio variables have been winsorized at 1% level to minimize the impact of outliers. ***, ** and * denote significance at 10%, 5% and 1% respectively.

Variable	Mean	Mean	Mean	Diff
Group	**L IOR**	**M IOR**	**H IOR**	**H-L**
Gross INV	13.24%	11.14%	13.54%	-0.30%
CAPX	6.75%	7.11%	7.85%	-1.09%***
RD	6.84%	5.07%	3.58%	3.26%***
AQ	2.14%	2.64%	3.64%	-1.50%***
Q	18.57%	13.76%	12.99%	5.58%***
Controlling for Q				
Gross INV	-1.10%	-0.94%	1.82%	-2.92%***
CAPX	-0.64%	-0.10%	0.65%	-1.29%***
RD	1.42%	0.06%	-1.28%	2.70%***
AQ	-0.83%	-0.14%	0.89%	-1.72%***

Table 3 **Institutional Ownership around the Russell 1000/2000 Threshold**

This table presents institutional ownership for firms around the Russell 1000/2000 indexes from 1984 to 2006. We calculate the mean of institutional ownership one-, two- and three-quarter after Russell 1000/2000 index reconstitution each year (Namely, September, December and March institutional ownership). Panel A compares the mean of institutional ownership for a fixed bandwidth of 50, 100 and 200. Panel B reports the bias-corrected treatment effect estimate using regression discontinuity design for institutional ownership. We use CCT rule of thumb bandwidth as well as two fixed bandwidth of 100 and 200 manually. Panel C provides the treatment effect for different types of institutional ownership. We use the code/methodology of Calonico, Cattaneo and Titiunik (2014b) to perform the regression discontinuity analysis. . ***, ** and * denote significance at 10%, 5% and 1% respectively.

Panel A *Univariate Analysis of Institutional Ownership*

	Bandwidth ±50			Bandwidth ±100			Bandwidth ±200		
	Russell 1000		Russell 2000	Russell 1000		Russell 2000	Russell 1000		Russell 2000
Institutional Ownership, q+1									
Total	37.1%	***	58.2%	43.1%	***	57.9%	48.7%	***	56.7%
Quasi-Indexer	19.8%	***	34.0%	24.7%	***	34.2%	29.0%	***	34.2%
Dedicated	6.9%		7.7%	7.0%	*	7.6%	7.2%		7.3%
Transient	9.9%	***	16.2%	11.1%	***	15.8%	12.1%	***	14.9%
Institutional Ownership, q+2									
Total	38.4%	***	58.2%	44.1%	***	57.9%	49.6%	***	57.1%
Quasi-Indexer	20.3%	***	33.9%	25.2%	***	34.1%	29.3%	***	34.3%
Dedicated	7.1%		7.7%	7.0%		7.5%	7.2%		7.2%
Transient	9.8%	***	15.7%	10.9%	***	15.3%	12.0%	***	14.5%
Institutional Ownership, q+3									
Total	38.8%	***	58.8%	44.6%	***	58.6%	50.1%	***	57.8%
Quasi-Indexer	21.4%	***	35.1%	26.1%	***	35.3%	30.3%	***	35.5%
Dedicated	7.2%		7.8%	7.1%	*	7.7%	7.4%		7.4%
Transient	9.9%	***	15.7%	11.0%	***	15.3%	12.1%	***	14.6%

Table 3 (Continued)

Panel B *Regression Discontinuity Analysis of Institutional Ownership*

BW Type	(1) CCT	(2) Manual	(3) Manual
	Total	Total	Total
Institutional Onwership, q+1			
Bias-corrected Treatment Effects	0.269***	0.243***	0.271***
Robust p-value	0.000	0.000	0.000
BW Loc. Poly.	101	100	200
Institutional Onwership, q+2			
Bias-corrected Treatment Effects	0.252***	0.229***	0.254***
Robust p-value	0.000	0.000	0.000
BW Loc. Poly.	104.799	100.000	200.000
Institutional Onwership, q+3			
Bias-corrected Treatment Effects	0.250***	0.220***	0.253***
Robust p-value	0.000	0.000	0.000
BW Loc. Poly.	106	100	200

Table 3 (Continued)

Panel C *Regression Discontinuity Analysis of Institutional Ownership: By Type*

BW Type	(1) CCT QIX	(2) Manual QIX	(3) Manual QIX	(4) CCT DED	(5) Manual DED	(6) Manual DED	(7) CCT TRA	(8) Manual TRA	(9) Manual TRA
Institutional Ownership, q+1									
Bias-corrected Treatment Effects	0.188***	0.176***	0.192***	0.006	-0.021	-0.002	0.081***	0.089***	0.083***
Robust p-value	0.000	0.000	0.000	0.245	0.201	0.878	0.000	0.000	0.000
BW Loc. Poly.	86	100	200	354	100	200	129	100	200
Institutional Ownership, q+2									
Bias-corrected Treatment Effects	0.182***	0.173***	0.185***	0.005	-0.021	-0.003	0.073***	0.079***	0.074***
Robust p-value	0.000	0.000	0.000	0.320	0.210	0.800	0.000	0.000	0.000
BW Loc. Poly.	85	100	200	381	100	200	136	100	200
Institutional Ownership, q+3									
Bias-corrected Treatment Effects	0.181***	0.167***	0.185***	0.005	-0.023	-0.005	0.073***	0.074***	0.073***
Robust p-value	0.000	0.000	0.000	0.412	0.169	0.658	0.000	0.000	0.000
BW Loc. Poly.	87	100	200	352	100	200	136	100	200

Table 4 **Corporate Investment around the Russell 1000/2000 Threshold**

This table presents investment of firms around the Russell 1000/2000 indexes from 1984 to 2006. Corporate investment are defined as changes in total assets (Gross INV), capital expenditures (CAPX), research and development expenditures (RD) and acquisition expenses (AQ), all scaled by lagged total assets. Panel A compares the mean of corporate investment for a fixed bandwidth of 50, 100 and 200. Panel B reports the bias-corrected treatment effect estimate using regression discontinuity design for corporate investment. We use CCT rule of thumb bandwidth as well as two fixed bandwidth of 100 and 200 manually. We use the code/methodology of Calonico, Cattaneo and Titiunik (2014b) to perform the regression discontinuity analysis. . ***, ** and * denote significance at 10%, 5% and 1% respectively.

Panel A *Univariate Analysis of Corporate Investment*

	Bandwidth ±50			Bandwidth ±100			Bandwidth ±200		
	Russell		Russell	Russell		Russell	Russell		Russell
Gross	15.4%	**	21.0%	14.9%	**	18.7%	14.9%	**	17.7%
CAPX	9.2%		8.5%	8.7%		8.4%	8.6%		8.5%
RD	2.5%	**	3.9%	2.6%	**	3.9%	2.8%	**	3.7%
AQ	3.6%	**	5.0%	3.4%	**	4.6%	3.5%	**	4.3%

Panel B *Regression Discontinuity Analysis of Corporate Investment*

	(1)	(2)	(3)	(4)	(5)	(6)
	CCT	Manual	Manual	CCT	Manual	Manual
Variable	Gross INV	Gross INV	Gross INV	CAPX	CAPX	CAPX
Bias-corrected Treatment Effects	0.050***	0.077	0.075**	-0.005	-0.007	-0.011
Robust p-value	0.004	0.112	0.024	0.260	0.534	0.172
BW Loc. Poly.	356	100	200	335	100	200

	(7)	(8)	(9)	(10)	(11)	(12)
	CCT	Manual	Manual	CCT	Manual	Manual
Variable	RD	RD	RD	AQ	AQ	AQ
Bias-corrected Treatment Effects	0.017***	0.017**	0.017***	0.013***	0.023*	0.020**
Robust p-value	0.000	0.028	0.003	0.006	0.068	0.026
BW Loc. Poly.	195	100	200	424	100	200

Table 5 **Corporate Investment (Residual) around the Russell 1000/2000 Threshold**

This table presents residual investment of firms around the Russell 1000/2000 indexes from 1984 to 2006. Residual investment is the residual taken from regress investment on investment opportunities. Corporate investment are defined as changes in total assets (Gross INV), capital expenditures (CAPX), research and development expenditures (RD) and acquisition expenses (AQ), all scaled by lagged total assets and is regressed on Q. Panel A compares the mean of residual corporate investment for a fixed bandwidth of 50, 100 and 200. Panel B reports the bias-corrected treatment effect estimate using regression discontinuity design for residual corporate investment. We use CCT rule of thumb bandwidth as well as two fixed bandwidth of 100 and 200 manually. We use the code/methodology of Calonico, Cattaneo and Titiunik (2014b) to perform the regression discontinuity analysis. . ***, ** and * denote significance at 10%, 5% and 1% respectively.

Panel A *Univariate Analysis of Residual Corporate Investment*

	Bandwidth ±50			Bandwidth ±100			Bandwidth ±200		
	Russell		Russell	Russell		Russell	Russell		Russell
Gross	0.1%	**	4.3%	0.1%	**	2.7%	0.4%	**	2.3%
CAPX	1.0%	*	0.3%	0.7%		0.3%	0.6%		0.4%
RD	-1.8%	**	-0.5%	-1.6%	**	-0.5%	-1.4%	**	-0.6%
AQ	0.0%	**	1.3%	-0.1%	**	1.0%	0.1%	**	0.7%

Panel B *Regression Discontinuity Analysis of Corporate Investment*

	(1)	(2)	(3)	(4)	(5)	(6)
	CCT	Manual	Manual	CCT	Manual	Manual
Variable	Gross INV	Gross INV	Gross INV	CAPX	CAPX	CAPX
Bias-corrected Treatment Effects	0.037***	0.081**	0.073***	-0.006	-0.006	-0.011
Robust p-value	0.007	0.028	0.005	0.153	0.581	0.163
BW Loc. Poly.	415	100	200	341	100	200

	(7)	(8)	(9)	(10)	(11)	(12)
	CCT	Manual	Manual	CCT	Manual	Manual
Variable	RD	RD	RD	AQ	AQ	AQ
Treatment Effects	0.016***	0.017**	0.016***	0.012***	0.026**	0.022**
Treatment Effects						
Robust p-value	0.000	0.021	0.002	0.007	0.035	0.013
BW Loc. Poly.	199	100	200	472	100	200

Table 6 **Institutional Ownership and Investment Sensitivity**

This table reports the results of estimating investment equation (2) in order to compare the differences in investment for firms with low institutional ownership and firms with high institutional ownership. Columns (1) to (3) separates samples into three groups based on the level of institutional ownership. Column (4) introduces interaction term for Gross INV. The rest columns are for CAPX, RD and AQ respectively. All regressions include firm and year fixed effects. p-values are reported in the parenthesis. Standard-errors are heteroskedasticity-consistent and are clustered at firm level. ***, ** and * denote significance at 10%, 5% and 1% respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	L IOR	M IOR	H IOR	All Firms	L IOR	M IOR	H IOR	All Firms
Dependent	Gross INV	Gross INV	Gross INV	Gross INV	CAPX	CAPX	CAPX	CAPX
	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS
Q	0.280***	0.348***	0.516***	0.309***	0.025***	0.029***	0.045***	0.029***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
*IOR*Q*				0.158***				0.006*
				(0.000)				(0.073)
IOR				-0.090***				0.013***
				(0.000)				(0.000)
Constant	0.080***	0.028**	0.013	0.078***	0.093***	0.044***	0.046***	0.037***
	(0.000)	(0.022)	(0.129)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	34,169	36,694	39,364	110,227	33,762	36,328	38,970	109,060
Adjusted R^2	0.200	0.292	0.327	0.241	0.420	0.534	0.608	0.488

Table 6 (Continued)

	(9) L IOR RD	(10) M IOR RD	(11) H IOR RD	(12) All Firms RD	(13) L IOR AQ	(14) M IOR AQ	(15) H IOR AQ	(16) All Firms AQ
Dependent	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS
Q	0.008***	0.014***	0.016***	0.011***	0.030***	0.041***	0.076***	0.031***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
*IOR*Q*				0.006*				0.046***
				(0.070)				(0.000)
IOR				-0.028***				0.014***
				(0.000)				(0.000)
Constant	0.065***	0.042***	0.028***	0.059***	0.010***	0.024***	0.015***	0.015***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.008)	(0.000)	(0.000)	(0.000)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	34,169	36,694	39,364	110,227	33,161	34,914	36,765	104,840
Adjusted R^2	0.780	0.831	0.827	0.791	0.150	0.187	0.172	0.156

Table 7 **Institutional Ownership and Investment Sensitivity: Instrumental Variable Analysis**

This table reports the results of estimating investment equation (3) using two-stage least square instrumental variable regression. Instrumental variable is a dummy variable that equals one if the firm is in the S&P 500 index. Columns (1) to (4) are regression results without control variables while Columns (5) to (8) are results with controls. First-stage regression results are reported in Appendix C. All regressions include firm and year fixed effects. p-values are reported in the parenthesis. Standard-errors are heteroskedasticity-consistent and are clustered at firm level. ***, ** and * denote significance at 10%, 5% and 1% respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent	Gross INV	CAPX	RD	AQ	Gross INV	CAPX	RD	AQ
	IV	IV	IV	IV	IV	IV	IV	IV
Q	0.179***	0.015***	0.011***	0.015**	0.145***	0.012***	0.013***	0.009
	(0.000)	(0.000)	(0.000)	(0.030)	(0.000)	(0.001)	(0.000)	(0.107)
*Q*IOR*	0.776***	0.073***	0.005	0.124***	0.493***	0.048***	0.023**	0.069***
	(0.000)	(0.000)	(0.554)	(0.000)	(0.000)	(0.003)	(0.022)	(0.010)
IOR	-0.582***	-0.075	-0.036	0.028	-0.244	-0.049	-0.023	0.099*
	(0.000)	(0.171)	(0.215)	(0.578)	(0.205)	(0.354)	(0.424)	(0.058)
ROA					0.070*	0.039***	-0.043***	0.056***
					(0.081)	(0.000)	(0.000)	(0.000)
CF					0.384***	0.013***	-0.062***	-0.012**
					(0.000)	(0.001)	(0.000)	(0.037)
LEV					0.855***	0.058***	0.003**	0.181***
					(0.000)	(0.000)	(0.050)	(0.000)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	108,826	107,657	108,826	103,391	108,230	107,165	108,230	102,898
Adjusted R^2	0.041	-0.041	-0.081	-0.062	0.267	0.017	0.009	0.096

Table 8 **Passive Institutional Ownership and Investment Sensitivity: Instrumental Variable Analysis**

This table reports the results of estimating investment equation (3) using two-stage least square instrumental variable regression. Instrumental variable is a dummy variable that equals one if the firm is in the S&P 500 index. First-stage regression results are reported in Appendix C. All regressions include firm and year fixed effects. p-values are reported in the parenthesis. Standard-errors are heteroskedasticity-consistent and are clustered at firm level. ***, ** and * denote significance at 10%, 5% and 1% respectively.

	(1)	(2)	(3)	(4)
Dependent	Gross INV	CAPX	RD	AQ
	IV	IV	IV	IV
Q	0.172***	0.015***	0.014***	0.010**
	(0.000)	(0.000)	(0.000)	(0.013)
*Q*IOR_QIX*	0.661***	0.059***	0.029**	0.115***
	(0.000)	(0.004)	(0.021)	(0.001)
IOR_QIX	-0.225	-0.042	-0.020	0.075*
	(0.130)	(0.313)	(0.386)	(0.064)
ROA	0.069*	0.038***	-0.044***	0.063***
	(0.072)	(0.000)	(0.000)	(0.000)
CF	0.382***	0.013***	-0.062***	-0.013**
	(0.000)	(0.000)	(0.000)	(0.020)
LEV	0.855***	0.058***	0.003**	0.179***
	(0.000)	(0.000)	(0.030)	(0.000)
Year Fixed Effects	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes
Observations	108,230	107,165	108,230	102,898
Adjusted R^2	0.275	0.029	0.008	0.108

Table 9 **Passive Institutional Ownership and Investment Sensitivity: by KZ4 Index**

This table reports the results of estimating investment equation (3) using two-stage least square instrumental variable regression. Instrumental variable is a dummy variable that equals one if the firm is in the S&P 500 index.We separate the whole sample into three subgroups by KZ4 index. We report regression results for firms with the lowest KZ4 index and for firms with the highest KZ4 index. All regressions include firm and year fixed effects. p-values are reported in the parenthesis. Standard-errors are heteroskedasticity-consistent and are clustered at firm level. ***, ** and * denote significance at 10%, 5% and 1% respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	L KZ4	H KZ4	L KZ4	H KZ4	L KZ4	H KZ4	L KZ4	H KZ4
Dependent	Gross INV	Gross INV	CAPX	CAPX	RD	RD	AQ	AQ
	IV	IV	IV	IV	IV	IV	IV	IV
Q	0.069***	0.161***	0.002	0.017***	0.012***	0.007***	-0.013	0.019***
	(0.007)	(0.000)	(0.646)	(0.000)	(0.005)	(0.000)	(0.183)	(0.002)
*Q*IOR_QIX*	1.136***	0.175	0.103***	-0.008	0.097***	-0.003	0.204***	0.041
	(0.000)	(0.288)	(0.001)	(0.776)	(0.001)	(0.689)	(0.007)	(0.436)
IOR_QIX	-1.265***	0.008	-0.281**	0.010	-0.091	-0.008	0.063	-0.044
	(0.006)	(0.976)	(0.018)	(0.889)	(0.154)	(0.656)	(0.488)	(0.524)
ROA	0.127	0.066	0.057***	-0.008	-0.024*	-0.041***	0.039***	0.066***
	(0.110)	(0.178)	(0.000)	(0.395)	(0.088)	(0.000)	(0.000)	(0.000)
CF	-0.040	0.357***	-0.031***	0.042***	-0.140***	-0.032***	-0.028***	-0.006
	(0.628)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)	(0.567)
LEV	1.113***	1.282***	0.070***	0.093***	0.028***	0.020***	0.183***	0.246***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	34,615	34,581	34,361	34,133	34,615	34,581	32,869	33,159
Adjusted R^2	0.075	0.552	-0.174	-0.034	0.042	-0.095	-0.048	0.144

Table 10 **Passive Institutional Ownership and Investment Sensitivity: by Cash Holdings**

This table reports the results of estimating investment equation (3) using two-stage least square instrumental variable regression. Instrumental variable is a dummy variable that equals one if the firm is in the S&P 500 index. We separate the whole sample into three subgroups by cash holdings. We report regression results for firms with the lowest cash holdings and for firms with the highest cash holdings. All regressions include firm and year fixed effects. p-values are reported in the parenthesis. Standard-errors are heteroskedasticity-consistent and are clustered at firm level. ***, ** and * denote significance at 10%, 5% and 1% respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	L CASH	H CASH	L CASH	H CASH	L CASH	H CASH	L CASH	H CASH
Dependent	Gross INV	Gross INV	CAPX	CAPX	RD	RD	AQ	AQ
	IV	IV	IV	IV	IV	IV	IV	IV
Q	0.217***	0.032	0.016***	-0.006	0.004**	0.001	0.022***	-0.021
	(0.000)	(0.312)	(0.000)	(0.407)	(0.020)	(0.853)	(0.000)	(0.217)
*Q*IOR_QIX*	0.250**	1.311***	0.021	0.167***	0.006	0.164***	-0.001	0.308**
	(0.045)	(0.000)	(0.320)	(0.003)	(0.392)	(0.003)	(0.975)	(0.027)
IOR_QIX	0.350	-0.756**	0.007	-0.254**	-0.005	-0.077	0.051	0.314**
	(0.125)	(0.037)	(0.891)	(0.016)	(0.648)	(0.445)	(0.420)	(0.035)
ROA	0.272***	0.004	0.081***	0.024***	-0.019**	-0.054***	0.100***	0.044***
	(0.000)	(0.950)	(0.000)	(0.001)	(0.041)	(0.000)	(0.000)	(0.001)
CF	0.643***	0.243***	0.045***	-0.004	-0.003	-0.108***	0.014	-0.028***
	(0.000)	(0.000)	(0.000)	(0.466)	(0.701)	(0.000)	(0.257)	(0.003)
LEV	0.931***	0.884***	0.063***	0.060***	0.003**	0.012***	0.216***	0.155***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.028)	(0.004)	(0.000)	(0.000)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	35,047	33,866	34,691	33,558	35,047	33,866	32,751	32,654
Adjusted R^2	0.435	0.066	0.001	-0.163	-0.151	0.009	0.133	-0.205

Table 11 **Corporate Investment around Pseudo Russell 1000/2000 Threshold**

This table reports the bias-corrected treatment effect estimate using regression discontinuity design for corporate investment around the Russell 1000/2000 indexes from 1984 to 2006 using pseudo threshold. Panel A reports results using 950th rank as the pseudo threshold. Panel B reports results using 1050th rank as the pseudo threshold Corporate investment are defined as changes in total assets (Gross INV), capital expenditures (CAPX), research and development expenditures (RD) and acquisition expenses (AQ), all scaled by lagged total assets.. We use CCT rule of thumb bandwidth as well as two fixed bandwidth of 100 and 200 manually. We use the code/methodology of Calonico, Cattaneo and Titiunik (2014b) to perform the regression discontinuity analysis. . ***, ** and * denote significance at 10%, 5% and 1% respectively.

Panel A *950th Rank as the Pseudo Threshold*

	(1)	(2)	(3)	(4)	(5)	(6)
	CCT	Manual	Manual	CCT	Manual	Manual
Variable	Gross INV	Gross INV	Gross INV	CAPX	CAPX	CAPX
Bias-corrected	0.030**	0.008	-0.002	0.006	0.003	0.008
Robust p-value	0.047	0.845	0.942	0.161	0.761	0.249
BW Loc. Poly.	451	100	200	355	100	200

	(7)	(8)	(9)	(10)	(11)	(12)
	CCT	Manual	Manual	CCT	Manual	Manual
Variable	RD	RD	RD	AQ	AQ	AQ
Bias-corrected	-0.003	-0.006	-0.007	0.007*	0.015	0.006
Robust p-value	0.378	0.421	0.181	0.087	0.136	0.396
BW Loc. Poly.	215	100	200	450	100	200

Table 11 (Continued)

Panel B *1050th Rank as the Pseudo Threshold*

Variable	(1) CCT Gross INV	(2) Manual Gross INV	(3) Manual Gross INV	(4) CCT CAPX	(5) Manual CAPX	(6) Manual CAPX
Bias-corrected	-0.050**	-0.046	-0.067**	-0.005	-0.009	-0.005
Robust p-value	0.013	0.226	0.013	0.229	0.375	0.460
BW Loc. Poly.	224	100	200	427	100	200

Variable	(7) CCT RD	(8) Manual RD	(9) Manual RD	(10) CCT AQ	(11) Manual AQ	(12) Manual AQ
Bias-corrected	0.000	-0.000	-0.004	-0.010	-0.021*	-0.018**
Robust p-value	0.930	0.969	0.486	0.131	0.096	0.042
BW Loc. Poly.	247	100	200	240	100	200

Table 12 **Alternative Measure of Optimal Investment**

Panel A *Estimating Inefficient Investment (INF)*

This table reports results of estimating investment equation (2). We take the absolute value of the residual from this regression and use it as the dependent variable for the second stage regression. INF1 to INF4 corresponds to residuals from Column 1 to 4 respectively. All regressions include firm and year fixed effects. Panel A reports the first-stage results. Panel B reports the results of regressing residual from first-stage on institutional ownership and passive institutional ownership. Instrumental variable is a dummy variable that equals one if the firm is in the S&P 500 index. p-values are reported in the parenthesis. Standard-errors are heteroskedasticity-consistent and are clustered at firm level. ***, ** and * denote significance at 10%, 5% and 1% respectively.

	(1)	(2)	(3)	(4)
Dependent	Gross INV	CAPX	RD	AQ
	OLS	OLS	OLS	OLS
Q	0.245***	0.022***	0.017***	0.023***
	(0.000)	(0.000)	(0.000)	(0.000)
ROA	0.107***	0.041***	-0.042***	0.069***
	(0.009)	(0.000)	(0.000)	(0.000)
CASH	0.374***	0.012***	-0.062***	-0.015**
	(0.000)	(0.001)	(0.000)	(0.012)
LEV	0.865***	0.059***	0.004**	0.180***
	(0.000)	(0.000)	(0.016)	(0.000)
Constant	-0.201***	0.027***	0.045***	-0.025***
	(0.000)	(0.000)	(0.000)	(0.000)
Year Fixed Effects	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes
Observations	109,632	108,569	109,632	104,346
Adjusted R^2	0.402	0.508	0.808	0.284

Panel B *2SLS IV Regression for Absolute Value of the Residual*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent	INF1	INF1	INF2	INF2	INF3	INF3	INF4	INF4
	IV	IV	IV	IV	IV	IV	IV	IV
IOR	-0.333***	-0.047***	-0.045***	-0.031***				
	(0.000)	(0.000)	(0.000)	(0.000)				
IOR_QIX					-0.429***	-0.060***	-0.059***	-0.040***
					(0.000)	(0.000)	(0.000)	(0.000)
Constant	0.284***	0.050***	0.036***	0.051***	0.261***	0.047***	0.032***	0.049***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Observations	109,632	108,569	109,632	104,346	109,632	108,569	109,632	104,346
Adjusted R^2	-0.062	-0.013	-0.058	-0.036	-0.012	0.007	-0.013	-0.023

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