The Effect of Index Inclusion on Corporate Risk-taking Behavior

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ผลกระทบของการถูกจัดให้อยู่ในดัชนีต่อพฤติกรรมเสี่ยงขององค์กรธุรกิจ

นายธนิสร ภาสุรปัญญา

วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาวิทยาศาสตรมหาบัณฑิต
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ธนิสร ภาสุรปัญญา : ผลกระทบของการถูกจัดให้อยู่ในดัชนีต่อพฤติกรรมเสี่ยงขององค์กรธุรกิจ (The Effect of Index Inclusion on Corporate Risk-taking Behavior) อ.ที่ปรึกษาวิทยานิพนธ์หลัก: อ. ดร. คณิสร์ แสงโชติ, 50 หน้า.

งานวิจัยนี้ทำการศึกษาผลกระทบของการถูกจัดให้อยู่ในดัชนี SET 50 ต่อพฤติกรรมเสี่ยงขององค์กรธุรกิจด้วยวิธี regression discontinuity designs ปัญหาตัวแทนอาจส่งผลให้พฤติกรรมเสี่ยงขององค์กรธุรกิจต่ำกว่าระดับที่เหมาะสมจากมุมมองของนักลงทุนที่มีการกระจายความเสี่ยงที่ดี ผู้เขียนตั้งสมมติฐานว่าการถูกจัดให้อยู่ในดัชนี SET 50 จะทำให้ผู้ลงทุนสถาบันลงทุนในองค์กรธุรกิจนั้นมากขึ้นและทำให้นักลงทุนทั่วไปสนใจองค์กรธุรกิจนั้นมากขึ้น ปัจจัยเหล่านี้จะส่งผลให้การตรวจสอบดีขึ้นและในที่สุดทำให้ระดับพฤติกรรมเสี่ยงขององค์กรธุรกิจสูงขึ้น อย่างไรก็ตามผลของการวิจัยชี้ว่าการถูกจัดให้อยู่ในดัชนี SET 50 ไม่ได้ทำให้ผู้ลงทุนสถาบันลงทุนในองค์กรธุรกิจนั้นมากขึ้นและไม่ได้ทำให้ระดับพฤติกรรมเสี่ยงขององค์กรธุรกิจนั้นสูงขึ้น อย่างไรก็ดี ผู้เขียนพบว่าการถูกจัดให้อยู่ในดัชนี SET 50 มีผลกระทบในทางบวกต่อจำนวนผู้ถือหุ้นและอัตราการจ่ายปันผลอย่างมีนัยสำคัญทางสถิติ ผลกระทบนี้สามารถตีความได้ว่าเป็น bonding expenditure ที่ตัวแทนก่อขึ้นด้วยความสมัครใจ โดยสรุปแล้วผลของงานวิจัยนี้ไม่ได้สนับสนุนแนวคิดที่ว่าการถูกจัดให้อยู่ในดัชนี SET 50 ส่งผลให้การตรวจสอบดีขึ้น

ภาควิชา	การธนาคารและการเงิน	ลายมือชื่อนิสิต	....
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This study examines the effect of SET 50 Index inclusion on corporate risk-taking behavior using regression discontinuity designs. Because of agency problems, firms' levels of risk-taking can be suboptimal from the perspective of well-diversified shareholders. I hypothesize that inclusion in SET 50 Index would increase firms' percentage of institutional ownership and investors' awareness of the firms. These would in turn improve monitoring of the firms and thus raise the levels of risk-taking. The results, however, suggest that SET 50 Index inclusion does not increase the percentage of institutional ownership or the levels of risk-taking. Nevertheless, I find statistically significant positive effect of the inclusion on number of shareholders and payout ratio, which is probably best interpreted as a bonding expenditure voluntarily incurred by management. Overall, these results do not support the notion that SET 50 Index inclusion improves monitoring of the included firms.

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1. INTRODUCTION

"If both parties to the relationship are utility maximizers, there is good reason to believe that the agent will not always act in the best interests of the principal."

− Jensen and Meckling (1976)

In an ideal world firms would invest in projects with the highest net present values. In reality, however, with information asymmetry, agency problems exist and can restrain firms from such optimal investment. John, Litov, and Yeung (2008) argue that management would, ceteris paribus, divert corporate resources for their own private benefits. Because cash flow that is available for management diversion is prior to shareholders' claims, management may forego value-maximizing projects that are high-risk in order to protect their private benefits. That is, management behave much like debtholder, and the level of corporate risk-taking would be below optimal from the perspective of well-diversified shareholders.

Other models of agent-principle conflicts also predict suboptimal risk-taking. Amihud and Lev (1981), Holstrom and Ricart I Costa (1986), and Hirshleifer and Thakor (1992) suggest that management prefer relatively safe projects to high-risk but value-enhancing projects in order to limit their undiversifiable employment risk, e.g., managerial reputation risk and risk of losing job. Also, May (1995) and Panousi and Papanikolaou (2012) show that when management hold substantial amount of the companies' equity, they reduce their firms' levels of risk-taking.

In this study, I investigate the effect of SET 50 Index inclusion on corporate risk-taking. On the surface, the link between firms' risk-taking and index inclusion, which is determined by an arbitrary rule such as relative market capitalization ranking, is not obvious. However, index inclusion can increase institutional investors' interest in the included companies (Lu, 2013; Cao, Gustafson, and Velthuis, 2014; Crane, Michenaud, and Weston, 2014; Appel, Gormley, and Keim, 2014; Mullins, 2014; Boone and White, 2015) and also the awareness of the included companies among investors in general (Denis et al., 2003; Chen, Noronha, and Singal, 2004). These two factors in turn can lead to improvement in monitoring. All else being equal, improved monitoring should increase the probability of management being caught extracting private benefits and thus decrease the expected utility from doing so. This should diminish excessive risk avoidance by management and bring risk-taking closer to an optimal level.

The fact that the inclusion into SET 50 Index is determined largely by relative market capitalization ranking makes it suitable for causal inference by regression discontinuity designs approach. The intuition is that firms near the SET 50 Index cutoff on both sides are systematically the same in all aspects except for the market capitalization ranking. So, any difference in risk-taking level between firms just included in the index and firms just excluded can be attributed to the effect of index inclusion.

Following Crane, Michenaud, and Weston (2014) and Boone and White (2015), comparison of average risk-taking, average institutional ownership, and average investors' awareness of firms close to the index cutoff are first conducted. Then, linear and nonparametric regression discontinuity designs are implemented. Lastly, difference-in-differences method is used as a robustness test.

Unexpectedly, my results do not suggest that SET 50 Index inclusion has an effect on firms' level of risk-taking. In all specifications, risk-taking of firms just inside the index and that of firms just outside are not statistically significantly different. Moreover, institutional ownership also does not seem to be affected by index inclusion. This may be because most Thai institutional investors are not benchmarked against SET 50 Index. The effect of SET 50 Index inclusion on number of shareholders, however, is positive and statistically significant.

I also conduct additional analysis to see whether SET 50 Index inclusion has any effect on other firm characteristics. One of the firm characteristics that the inclusion has a statistically significant effect on is payout ratio. I find that index inclusion leads to 20.84 to 31.15 percent higher payout ratio. Even though other studies also find positive effect of index inclusion on dividend payout, they cite an improvement in corporate governance as a result of increased monitoring from institutional investors as the cause of the increase in payout (Appel, Gormley, and Keim, 2014; Crane, Michenaud, and Weston, 2014). Since I do not find any increase in institutional ownership after SET 50 Index assignment, the institutional ownership explanation is not satisfactory in this setting.

The increase in payout ratio could be a result of intensified monitoring caused by the increase in investors' awareness, as measured by number of shareholders. However, the lack of improvement in idiosyncratic risk-taking and the fact that an increase in number of shareholders, in other words more dispersed ownership, may even reduce monitoring weigh against this hypothesis. So, the most plausible explanation for my results may be that management voluntarily increase the dividend payout as a bonding mechanism, substituting for any decline in monitoring by shareholders (Easterbrook, 1984).

The rest of this paper is organized as follows. Section 2 reviews previous literature on corporate risk-taking and the effects of index inclusion. Section 3 develops the hypotheses of this study. Section 4 describes SET indices construction and also the sample used. Section 5 explains my methodology and establishes its validity. Section 6 presents the results and the discussion of the results. Robustness check is shown in Section 7. Lastly, Section 8 concludes.

2. LITERATURE REVIEW

Corporate Risk-taking

Much of the literature on corporate risk-taking predict and document suboptimal risk-taking as a result of agency problems. Management are hypothesized to reduce their undiversifiable employment risk by using conglomerate mergers (Amihud and Lev, 1981) and by avoiding investment in risky projects (Holstrom and Ricart I Costa, 1986). Theoretical work by Hirshleifer and Thakor (1992) also suggests that management's incentive to protect their reputation makes them prefer relatively safe projects to value-enhancing but riskier projects. May (1995) shows empirical evidence that when CEOs have large amount of human capital vested in their firms, they tend to engage in risk-reducing activity. Similarly, Saunders, Strock, and Travlos (1990) find that banks controlled by management take less risk than banks controlled by shareholders while Faccio, Marchica, and Mura (2011) show that firms with nondiversified large shareholders take less risk than firms with well-diversified large shareholders.

Regulations and corporate governance policies can also affect agent-principle conflicts regarding risk-taking. John, Litov, and Yeung (2008) provide country-level evidences that better investor protection results in higher risk-taking by firms while another cross-country analysis by Acharya, Amihud and Litov (2011) find that stronger creditor rights in bankruptcy leads firms to engage in risk-reducing actions that destroy shareholder value. Furthermore, Ferreira and Laux (2007) show that firms with less antitakeover provisions have higher levels of idiosyncratic volatility.

Effects of Index Inclusion

The effect of index inclusion on stock price is well-documented in the literature. Many studies find that stocks that are added to (deleted from) popular indices such as S&P 500 generate positive (negative) abnormal return following the announcements (Shleifer, 1986; Harris and Gruel, 1986; Beneish and Whaley, 1996; Lynch and Mendenhall, 1997; Chang, Hong, and Liskovich, 2014). While positive abnormal return of stocks added to indices seems to be permanent, stocks deleted from indices recoup their losses in the longer run (Chen, Noronha, and Singal, 2004).

Many recent studies find discontinuously higher institutional ownership for firms included in Russell 2000 index, which in turn affects various corporate actions. Boone and White (2015) find that higher institutional ownership following index inclusion is related to greater firm transparency, while Mullins (2014) and Appel, Gormley, and Keim (2014) find such firms to have better corporate governance. Crane, Michenaud, and Weston (2014) find the positive shock to institutional ownership to be associated with higher payout ratio. Moreover, Cao, Gustafson, and Velthuis (2014) find that the jump in institutional ownership causes firms to rely less on bank financing and lean more toward seasoned equity offering though Lu (2013) find such jump to be associated with lower bank loan spread.

Other effects of index inclusion include higher awareness among investors (Chen, Noronha, and Singal, 2004), higher expected and realized earnings after inclusion (Denis et al., 2003), and higher trading liquidity (Hegde and McDermott, 2003).

3. HYPOTHESIS DEVELOPMENT

Institutional investors are relatively more effective at monitoring management because of sophistication, economies of scale in monitoring and lower coordination costs (Grossman and Hart, 1980; Shleifer & Vishny, 1986; Gillan and Starks, 2000). Mullins (2014), Appel, Gormley, and Keim (2014), and Crane, Michenaud, and Weston (2014) find that inclusion in Russell 2000 index causes firms to have higher institutional ownership leading to better monitoring. So, inclusion in SET 50 Index should lead to higher risk-taking via discontinuously higher monitoring by institutional investors as well.

Another channel in which SET 50 Index inclusion may affect risk-taking is via increased investors' awareness. Inclusion in a popular stock index can improve firm recognition among investors, makes them more likely to hold shares in the company, and put it under intensified monitoring (Denis et al., 2003; Chen, Noronha, and Singal,

2004) So, I expect to find discontinuously higher investors’ awareness and higher risk-taking for firms just included in SET 50 Index.

Hypothesis I

Inclusion in SET 50 Index increases firms’ percentage of institutional ownership.

Hypothesis II

Inclusion in SET 50 Index increases investors’ awareness of firms.

Hypothesis III

Inclusion in SET 50 Index increases firms’ level of risk-taking.

4. DATASET AND SET 50 INDEX CONSTRUCTION

SET Indices Construction

SET 50 Index and SET 100 Index are constructed based on a set of criteria; 1) the stock to be included in the indices must have been traded in the Stock Exchange of Thailand for at least six months; 2) the stock must not be likely to be delisted or suspended; 3) the stock’s 3-month average daily market capitalization must be in the top 200 of all the stocks traded on the Stock Exchange of Thailand; 4) free-float of the stock must be at least 20 percent of the company’s paid-up capital 5) it must also have monthly trading value above 50 percent of average monthly trading value per stock for at least nine out of twelve months; 6) the traded shares must be at least 5 percent of the listed shares of that company in months that its trading value satisfies the fifth criterion.

Stocks that pass all the criteria above are then ranked according to their average market capitalization[1]. The top 50 stocks are included in SET 50 Index, and the top 100 stocks are included in SET 100 Index. The stocks with ranking of 51 to 55 are placed in a reserve list for SET 50 Index, and the stocks with ranking of 101 to 105 are placed in a reserve list for SET 100 Index.

The indices memberships are reviewed twice a year: in June for index calculation during the second half of the year and in December for index calculation during the first half of the year after.

Dataset

My sample includes all firms that had joined SET 50 Index or SET 100 Index at least once between 2005 and 2014. This consists of 217 firms and 1,953 firm-period observations. The data of indices membership during the period is obtained from SETSMART database. Since SETSMART does not provide the average market capitalization ranking of stocks in the indices, daily market value data from Datastream database is used to calculate the ranking. The percentage of institutional ownership and the number of shareholders of each firm-period is obtained from 'Major Shareholder' and 'Distribution' data from SETSMART database. The number of shareholders data is winsorized at one percent. Weekly returns of stocks and SET Index, which are used to estimate the proxy for risk-taking, are retrieved from Datastream database. Lastly, firms' accounting information is also obtained from Datastream.

[1] Stock Exchange of Thailand discloses neither their ranking assignment nor how exactly the average market capitalization is computed.

5. METHODOLOGY

Risk-taking Measure

In this study, I focus on idiosyncratic risk as a measure of corporate risk-taking because management can easily hedge themselves against any exposure to systematic risk by selling SET 50 futures contract. Following Ferreira and Laux (2007) and Panousi and Papanikolaou (2012), I construct idiosyncratic risk-taking measure by first estimating a stock's β and α using the CAPM equation:

$$R_{it} = \alpha_{it} + \beta_{it} R_{MKT,t} + \varepsilon_{it} \quad (1)$$

where R_i is the weekly excess return of stock i, and R_{MKT} is the weekly excess return of Stock Exchange of Thailand Total Return Index (SETTRI). β_{it} and α_{it} are estimated using return over the past 150 weeks. Then I calculate residual returns of a stock by the following equation:

$$\epsilon_{it} = R_{it} - \alpha_{it} - \beta_{it} R_{MKT,t} \quad (2)$$

Finally, idiosyncratic risk of stock i is defined as the standard deviation of the residual returns ϵ_{it} over the past 25 weeks.

Regression Discontinuity Design

Causal effect of index inclusion on firm's risk-taking can be estimated by a regression discontinuity (RD) design. Thistlethwaite and Campbell (1960) first introduced RD design as a method of "estimating treatment effects in a non-experimental setting where treatment is determined by whether an observed assignment variable exceeds a known cutoff point" (Lee and Lemieux, 2010). The intuition behind RD designs is that subjects whose values of assignment variable are just below the cutoff are well-suited as controls for those just above the cutoff. RD designs rely on an assumption that subjects are not able to precisely manipulate the values of their assignment variable. If this condition is satisfied, all subjects will have about the same probability of being just above the cutoff (receiving the treatment) or just below the cutoff (being denied the treatment); close to the cutoff, the treatment variation will be as good as randomized.

In all RD specifications described below, I include in my sample only firms that are in SET 100 Index since including all firms listed on the Stock Exchange of Thailand might make the RD designs invalid. This is because firms can precisely control whether to pass the indices' initial criteria or not. Specifically, firms can precisely manage their free-float, which is defined as all shares held by investors subtracting shares held by firms' insiders, to be above or below 20 percent. Firms that choose to have free-float just above 20 percent and be included in the indices maybe systematically different from those that choose to have free float just below the threshold and not be included in the indices. By using only firms in SET 100 Index, firms just below SET 50 Index cutoff will be suitable as controls for firms just above since their only systematic difference is the market capitalization ranking, which they should not be able to precisely manipulate.

Estimating the Effect of Index Inclusion on Risk-taking

In my first test, following Crane, Michenaud, and Weston (2014) and Boone and White (2015), the effect of SET 50 Index inclusion on risk-taking can be shown by comparing the average risk-taking of firms close to the SET 50 Index cutoff. The regression equation is as follows:

$$Y_{it} = \alpha + \tau D_{it} + \varepsilon_{it} \quad (3)$$

where Y is firm's level of risk-taking. D is a dummy variable, taking value 1 if the firm is included in SET 50 Index and zero otherwise. In this test, the choice of sample bandwidth size is important. As more firms further away from the SET 50 Index cutoff are included, the precision of estimation is improved at the expense of potential biasedness, which is a result of decreasing comparability.

In the second test, the assignment variable, which is the firm's market capitalization ranking within SET 100 Index, is included in order to control for potential effects of the assignment variable on firm's risk-taking behavior. In the third test, moreover, nonlinear relationship between market capitalization ranking and firm risk-taking is allowed for. These additions permit me to increase the size of sample bandwidth to include firms further away from SET 50 Index cutoff. The regression equations are as follows:

$$Y_{it} = \alpha + \tau D_{it} + \delta_j Rank_{it} + \gamma_j D_{it} Rank_{it} + \varepsilon_{it} \quad (4)$$

$$Y_{it} = \alpha + \tau D_{it} + \sum_{j=1}^{3} \delta_j \, Rank_{it}^{j} + \sum_{j=1}^{3} \gamma_j D_{it} Rank_{it}^{j} + \varepsilon_{it} \quad (5)$$

where Y is firm's level of risk-taking. D is a dummy variable, taking value 1 if the firm is included in SET 50 Index and zero otherwise. $Rank$ is the distance of firm's three-month average market capitalization ranking within SET 100 Index from the SET 50 Index cutoff. In these regressions, the resulting τ coefficients represent the estimated effect of SET 50 Index inclusion on firms' risk-taking.

Estimating the Effect on Institutional Ownership and Investors' Awareness

To see whether the changes in institutional ownership and/or investors' awareness are responsible for the difference in risk-taking behavior, the same RD designs are used to verify discontinuities in institutional ownership and/or investors' awareness arising from index inclusion. In this case the dependent variable is either the firm's institutional shareholding as a percentage of total shares or number of shareholders, which is a proxy for investors' awareness (Chen, Noronha, and Singal, 2004).

Validity of Regression Discontinuity in SET 50 Index Setting

The validity of my methodology relies on an assumption that firms cannot precisely manipulate the assignment variable, which is their market capitalization ranking. Figure 1 plots firm market capitalization on the vertical axis and the market capitalization ranking on the horizontal axis. Visual examination reveals no discontinuity in market capitalization of firms around the SET 50 Index threshold, which would be expected if there were manipulation of market capitalization. Moreover, I empirically test for any discontinuity in market capitalization by using RD analyses described earlier. The results are shown in Table 3. In all specifications, the treatment coefficients are not statistically significant at conventional levels. These results suggest that firms cannot precisely manipulate their market capitalization ranking.

Furthermore, I use local mean comparison and RD analyses to test for any discontinuity in various firm characteristics prior to the inclusion to SET 50 Index (the variables are described in Appendix B). That is, I want to ensure that firms near the cutoff on both sides are not systematically different before being assigned or not assigned to the index. Table 1 displays the summary statistics of pre-assignment firm characteristics, and Table 2 presents the results of mean comparison of firms within three fixed bandwidths (±3, 6, and 9) around the cutoff. Table 3 displays the linear and nonparametric RD test results of firms in the bandwidths of ±3, 6, 9, 12, and 15. Overall, the pre-assignment characteristics of firms just above the index threshold and firms just below are not statistically significantly different. These results suggest that firms on both sides are similar and suitable as controls for each other.

6. RESULTS

The Effect on Institutional Ownership and Investors' Awareness

To assess whether SET 50 Index inclusion leads to better monitoring, I examine whether there is any significant difference in institutional ownership and/or number of shareholders between firms just above and below the SET 50 Index threshold. Table 5 displays the results of mean comparison of percentage of institutional ownership and number of shareholders of firms near the cutoff. In all specifications, the percentage of institutional ownership of firms just inside and just outside SET 50 Index are not statistically significantly different. Then, I conduct linear and nonparametric RD tests. Table 6 presents the treatment coefficients from the tests. These coefficients represent the estimated effect of the index inclusion on institutional ownership or number of shareholders. Consistent with the mean comparison results, none of the treatment coefficients are statistically significant. The RD results for institutional ownership are presented graphically in Figure 2 where the percentage of institutional ownership is plotted on the vertical axis and the market capitalization ranking on the horizontal axis. The lines represent a third-order polynomial RD curve from the ±12 bandwidth. The graph reveals that the difference in percentage of institutional ownership at the index cutoff is negligible. Overall, SET 50 Index inclusion does not seem to affect institutional ownership.

The empirical results for the number of shareholders, on the contrary, suggest a statistically significant positive effect of index inclusion on number of shareholders. For example, in the ±9 bandwidth, the treatment coefficient from nonparametric RD analysis shows that SET 50 Index inclusion causes firms to have 3,659 more shareholders than firms not included. Figure 3 graphically displays the RD results. Number of shareholders and market capitalization ranking are plotted on the vertical axis and horizontal axis respectively. The graph shows that firms included in the index have discontinuously greater number of shareholders.

The institutional ownership results contradict with the results from previous studies in the Russell Index setting (Mullins, 2014; Appel, Gormley, and Keim, 2014; Crane, Michenaud, and Weston, 2014; Boone and White, 2015). One explanation may be that even though SET 50 Index is a widely followed index, most institutional investors are not benchmarked against it. Performance of funds in Thailand are typically compared with SETTRI, a total return index comprises of all stocks listed on the Stock Exchange of Thailand. As a result, while institutional investors in the US increase their positions in firms included in a popular index in order to minimize tracking error, Thai institutional investors may not have an incentive to do so.

The Effect of Index Inclusion on Risk-taking

I present graphically the effect of SET 50 Index inclusion on idiosyncratic risk-taking in Figure 4 where the level of idiosyncratic risk-taking and the market capitalization ranking are plotted on the vertical axis and the horizontal axis respectively. The graph shows that any discontinuity in risk-taking at the SET 50 Index cutoff is indistinct. Then, I empirically estimate the effect of inclusion in SET 50 Index on idiosyncratic risk-taking using mean comparison, linear RD analysis, and nonparametric RD analysis. Table 5 presents the comparison of the average risk-taking between firms included in SET 50 Index and firms not included within three fixed bandwidths (±3, 6, and 9) around the threshold. The results show that firms included in SET 50 Index seem to take less idiosyncratic risk than firms that are not included, but the differences are not statistically significant at conventional levels. Table 6 displays the treatment coefficients from the linear RD tests and the nonparametric RD tests. The results are consistent with the graphical assessment and the mean comparison results: none of the treatment coefficients suggest statistically significant effect of SET 50 inclusion on firms' risk-taking behavior.

The Effect of Index Inclusion on Other Firm Characteristics

In addition to assessing the effect of SET 50 Index inclusion on idiosyncratic risk-taking behavior, I further investigate whether the inclusion has any effect, via larger number of shareholders, on other firm characteristics. Again, mean comparisons are conducted, and the results are presented in Table 7. In all specifications, return on asset, cash to asset, debt to enterprise value, and price to book ratio of firms just inside SET 50 Index and firms just outside are not statistically significantly different. On the other hand, the average payout ratio of firms just inside the index is statistically significantly higher than that of firms just outside in all specifications. For example, in the ±3 bandwidth, the average payout ratio of firms included in SET 50 Index is 49.56 percent while the average payout ratio of firms outside the index is 42.37 percent.

Next, the effect of SET 50 Index inclusion on the characteristics is estimated using linear and nonparametric RD designs. The results, which are displayed in Table 8, support the results from mean comparisons. None of the treatment coefficients suggest a statistically significant effect of the inclusion on return on asset, cash to asset, debt to enterprise value, and price to book ratio while the treatment coefficients on payout ratio are statistically significant at conventional levels in the majority of specifications. For instance, in the ±15 bandwidth, the nonparametric RD analysis estimates that inclusion in SET 50 index leads to 8.92 percentage point higher payout ratio.

The effect of SET 50 Index inclusion on payout ratio is also presented graphically in Figure 5. Payout ratio and market capitalization ranking are plotted on the vertical axis and the horizontal axis respectively. The graph reveals a large discontinuity in payout ratio at the SET 50 cutoff. That is, firms just inside the index pay significantly larger proportion of their net income out as dividends than firms just outside the index do.

Previous studies in the Russell index setting also find positive effect of index inclusion on dividend payout (Appel, Gormley, and Keim, 2014; Crane, Michenaud, and Weston, 2014). However, my results are not entirely consistent with theirs. Specifically, previous studies attribute higher payout to improvement in corporate governance, which in turn is a result of the increase in monitoring from higher institutional ownership; this is probably not the case in SET 50 Index setting. Since I do not find any statistically significant change in firms' institutional ownership after SET 50 Index assignment, the increase in payout ratio does not seem to be driven by an increase in monitoring from institutional investors.

It is possible that the increase in payout ratio is a result of intensified monitoring arising from greater investors' awareness as proxied by the number of shareholders. However, if monitoring did improve, we should have also observed higher idiosyncratic risk-taking. Moreover, while Appel, Gormley, and Keim (2014) find Russell 2000 inclusion to improve monitoring and reduce firms' cash holding, the lack of statistically significant effect of SET 50 Index inclusion on cash holding suggest that monitoring does not improve in SET 50 Index setting. Furthermore, it can even be argued that an increase number of shareholders should lead to weaker monitoring; because each shareholder holds a smaller fraction of the company, he or she reaps smaller benefits from monitoring. So, monitoring is probably not responsible for the increase in payout ratio.

There are a few other possible explanations for my results. One is that firms might increase dividend payout ratio because they experience improvement in profitability following an index inclusion. Denis et al's (2003) study of inclusion in S&P 500 index finds that firms' forecasted and realized earnings increase significantly following addition to the index. My results, however, are not consistent with theirs. I do not find SET 50 Index inclusion to have a statistically significant effect on return on asset. Consequently, higher payout ratio of firms included in SET 50 Index inclusion is not likely to be driven by improvement in profitability. Another possible explanation is that members of SET 50 Index are probably more likely to be more mature than non-SET 50 firms and thus have fewer growth opportunities. So, the increase in payout ratio might be reflecting diminishing investment opportunities. However, my results do not support this hypothesis; I do not find the average price to book ratio, a reciprocal of a widely used measure of growth opportunities, of firms just inside SET 50 Index to be statistically significantly different from that of firms just outside.

The most plausible explanation for my results is that higher dividend payout is a bonding cost voluntarily incurred by the management (Easterbrook, 1984). As ownership becomes more dispersed, monitoring becomes more costly for any individual investor, and agency problems increase. Rational investors would prudently be fearful of adverse selection and moral hazard risks that arise and thus discount value of equity accordingly. Because depressing equity value, where the value of a company with dispersed ownership is significantly less than if it is wholly owned by an owner-manager, can attract hostile takeover, management might choose to payout more dividends in order to assure shareholders of their intention in order to bring valuation of the company’s equity closer to what it would be in absence of agency problems. Higher payout can instill shareholders confidence because it is costly for the management. As less earning is retained in the firm, management have to keep coming back to the capital market in order to finance future investments. In effect, management subject themselves to recurrent scrutiny by lenders or investment bankers. So, the higher payout ratio observed is probably a bonding expenditure incurred by the management as a substitute for the decrease in monitoring as a result of more dispersed ownership.

7. ROBUSTNESS

Difference-in-Differences Estimation

I assess the robustness of my results by applying an alternative treatment effect estimation methodology, difference-in-differences (DiD) estimation. The regression equation is as follows:

$$Y_{it} = \alpha_i + \alpha_t + \tau D_{it} + Z'_{i,t-1}\theta + \beta Y_{i,t-1} + \varepsilon_{it} \quad (6)$$

where Y is the firm characteristic of interest, and D is a dummy variable, taking value 1 if the firm is included in SET 50 Index and zero otherwise. $Z'_{i,t-1}$ is a vector of firm characteristics in the period before. The variables included in the vector are described in Appendix B. $Y_{i,t-1}$ is the characteristic of interest in the period before. If the firm characteristic of interest is already included in the Z' vector, the variable $Y_{i,t-1}$ is dropped. The regressions also include both firm and time fixed effects.

Table 5 presents the τ coefficients. Overall, the results are consistent with my main results; the DiD estimates suggest that SET 50 Index inclusion has statistically significant positive effect on number of shareholders and payout ratio while its effect on institutional ownership, risk-taking, return on asset, cash to asset, and price to book value ratio is not statistically significant.

Interestingly, DiD results, unlike those from mean comparison or RD designs, suggest statistically significant negative effect of SET 50 Index inclusion on leverage. None of previous studies, to my knowledge, have found significant effect of index inclusion on capital structure. An explanation for this unique result may be that the decrease in debt to enterprise value is mechanical given that my measure of debt is the book value of debt, which is relatively static, and that the measure of enterprise value is the sum of the book value of debt and the market value of equity. So, as the numerator stays relatively stable while the denominator rises as a result of the well-documented positive abnormal return for the equity of firms added to popular stock indices, the debt to enterprise value ratio falls (Shleifer, 1986; Harris and Gruel, 1986; Beneish and Whaley, 1996; Lynch and Mendenhall, 1997; Chang, Hong, and Liskovich, 2014).

8. CONCLUSION

In this paper I use regression discontinuity designs to assess the effect of SET 50 Index inclusion on risk-taking behavior of included firms. The results do not support my hypothesis that the inclusion increases the level of risk-taking. Unlike the results from previous studies of inclusion in other popular equity indices, institutional ownership of firms does not seem to be higher for firms inside SET 50 Index. This is possibly because the index is not typically used as a benchmark for Thai institutional investors. Although I find the index inclusion to have statistically significant positive effect on number of shareholders and payout ratio, it is not likely that there is an improvement in monitoring from being in SET 50 Index. If the increase in payout ratio is a result of better monitoring, we should also see an increase in risk-taking and a decrease in cash holding. Moreover, the evidence does not suggest that the higher dividend payout is driven by higher profitability or less growth opportunities, so the higher dividend payout is probably best interpreted as a bonding expenditure voluntarily incurred by management.

This paper makes several contributions. First, contradictory to previous studies in the Russell index setting, I show that inclusion in SET 50 Index does not seem to improve monitoring. Second, this paper adds to emerging empirical literature that use regression discontinuity approach and index inclusion cutoff to study the inclusions' effects on various corporate actions. Moreover, this study is the first, to my knowledge, to use regression discontinuity designs in the context of SET 50 Index. Finally, it provides further evidence that market frictions like arbitrary index inclusion criteria can have meaningful effects on corporate actions.

APPENDIX A: The Effect of SET 100 Index Inclusion

I also analyze the effect of SET 100 Index inclusion. Only DiD method is used in this setting. As discussed in Section 5, because firms can precisely manipulate their free float and thus are able to choose whether to pass the initial SET indices screening criteria or not, RD designs approach would be invalid. The regression equation is the same as equation 6 except that the dummy variable D represents SET 100 Index membership instead of SET 50.

Table 10 presents the τ coefficients. The results suggest that SET 100 Index inclusion does not have statistically significant effect on number of shareholders, risk-taking, payout ratio, return on asset, cash to asset, or price to book ratio. Two characteristics that SET 100 Index inclusion has statistically significant effect on are institutional ownership and leverage; DiD estimations suggest positive effect on percentage of institutional ownership and negative effect on debt to enterprise value ratio. An explanation for higher institutional ownership may be that most companies outside SET 100 Index are too small for a typical mutual fund. Lower degree of leverage for firms inside SET 100 Index, just like in the case of SET 50 Index inclusion, is probably mechanical.

APPENDIX B: Variable Definitions

Market capitalization: The market value of common equity.

Number of shareholders: The number of shareholders obtained from SETSMART 'Distribution' database.

Institutional ownership: The sum of all shares held by institutional investors divided by total shares outstanding.

Idiosyncratic risk-taking: The standard deviation of residual returns over the past 25 weeks.

Payout ratio: Dividends paid as a percentage of net income.

Return on asset: Operating income as a percentage of total assets.

Cash to asset: Cash and cash equivalents as a percentage of total assets.

Debt to enterprise value: The book value of debt as a percentage of enterprise value, which is defined as the sum of the book value of debt and the market value of equity.

Price to book: The ratio of market value of equity to the book value of equity.

Table 1
Pre-assignment summary statistics

This table presents the summary statistics of firm characteristics prior to SET indices assignment. Variables are defined in Appendix B.

	Mean	StdDev	p25	Median	p75
Market capitalization (millions THB)	35,065	90,452	2,767	8,030	23,943
Payout ratio (percent)	42.885	27.761	26.300	41.670	59.260
Return on asset (percent)	8.872	15.203	3.550	7.850	12.580
Cash to asset (percent)	7.291	8.935	1.523	4.466	9.299
Debt to EV (percent)	33.186	23.806	13.599	31.351	50.903
Price to book ratio	2.326	2.296	1.100	1.720	2.750

Table 2

Mean comparison of pre-assignment firm characteristics around SET 50 Index cutoff

This table presents the average characteristics of firms within ± 3, 6, and 9 bandwidth around SET 50 Index cutoff. *, **, and *** indicate that the differences in average values are significantly different from zero at a significance level of 10%, 5%, and 1% respectively. Variables are described in Appendix B.

	Bandwidth ± 3		Bandwidth ± 6		Bandwidth ± 9	
	Non-SET 50	SET 50	Non-SET 50	SET 50	Non-SET 50	SET 50
Market capitalization (millions THB)	18,602	21,624	18,106	22,223***	17,452	23,385***
Payout ratio (percent)	48.548	53.223	45.231	49.283	42.162	46.211
Return on asset (percent)	10.533	11.790	9.392	10.146	8.780	9.853
Cash to asset (percent)	7.133	7.966	6.879	9.041	6.577	8.605*
Debt to EV (percent)	29.041	28.901	33.642	31.887	35.462	33.734
Price to book ratio	2.443	2.705	2.280	2.359	2.189	2.146

Table 3

Regression discontinuity analysis of pre-assignment firm characteristics around SET 50 Index cutoff

This table examines pre-assignment firm characteristics using regression discontinuity designs. Panel A displays the treatment coefficients from linear regression discontinuity tests of firms within various fixed bandwidths where the treatment coefficients are estimated by the equation $Y_{i,t-1} = \alpha + \tau D_{it} + \delta_j Rank_{it} + \gamma_j D_{it} Rank_{it} + \varepsilon_{it}$. Panel B shows the treatment coefficients from nonparametric regression discontinuity tests of firms within various fixed bandwidths where the treatment coefficients are estimated by the equation $Y_{i,t-1} = \alpha + \tau D_{it} + \sum_{j=1}^{3} \delta_j Rank_{it}^{j} + \sum_{j=1}^{3} \gamma_j D_{it} Rank_{it}^{j} + \varepsilon_{it}$. In both regression equations, D is a dummy variable, taking value 1 if the firm is included in SET 50 Index and zero otherwise, and $Rank$ is the distance of firm's three-month average market capitalization ranking within SET 100 Index from the SET 50 Index cutoff. *, **, and *** indicate that the treatment coefficients are significantly different from zero at a significance level of 10%, 5%, and 1% respectively. Variables are described in Appendix B.

Panel A: Linear regression discontinuity analysis of pre-assignment firm characteristics

	Bandwidth ± 3	Bandwidth ± 6	Bandwidth ± 9	Bandwidth ± 12	Bandwidth ± 15
Market capitalization (millions THB)	1,966.593	1,746.632	1,625.643	1,389.144	874.048
Payout ratio (percent)	2.529	2.535	7.252	6.297	4.304
Return on asset (percent)	0.727	0.451	0.978	1.847	1.379
Cash to asset (percent)	1.457	0.440	2.013	2.477	1.963
Debt to EV (percent)	-0.323	0.866	-3.672	-4.001	-2.191
Price to book ratio	-0.623	-0.263	0.005	0.003	-0.067

Panel B: Nonparametric regression discontinuity analysis of pre-assignment firm characteristics

	Bandwidth ± 3	Bandwidth ± 6	Bandwidth ± 9	Bandwidth ± 12	Bandwidth ± 15
Market capitalization (million THB)	3,033.700	2,141.605	2,008.619	1,785.351	1,275.568
Payout ratio (percent)	3.491	5.792	2.649	6.729	4.811
Return on asset (percent)	0.387	1.014	0.413	0.068	1.205
Cash to asset (percent)	-0.711	0.667	-0.234	0.771	1.908
Debt to EV (percent)	2.708	2.104	2.987	-1.536	-0.836
Price to book ratio	-0.485	-0.328	-0.151	0.030	-0.129

Table 4

Post-assignment summary statistics

This table presents the summary statistics of firm characteristics after SET indices assignment. Variables are defined in Appendix B.

	Mean	StdDev	p25	Median	p75
Number of shareholders	12,922	13,902	3,699	7,542	16,104
Institutional ownership (percent)	1.316	2.680	0.000	0.510	1.330
Idiosyncratic risk-taking	0.042	0.023	0.029	0.038	0.049
Payout ratio (percent)	42.777	27.952	25.870	41.690	59.060
Return on asset (percent)	8.291	12.524	3.240	7.600	12.070
Cash to asset (percent)	7.105	8.654	1.420	4.466	9.196
Debt to EV (percent)	32.904	23.626	13.512	30.964	50.317
Price to book ratio	2.269	2.298	1.060	1.650	2.680

Table 5

Mean comparison of monitoring and risk-taking behavior around SET 50 Index cutoff

This table presents the average percentage of institutional ownership, average number of shareholders, and average level of risk-taking of firms within ± 3, 6, and 9 bandwidth around SET 50 Index cutoff after SET indices assignment. *, **, and *** indicate that the differences in average values are significantly different from zero at a significance level of 10%, 5%, and 1% respectively. Variables are described in Appendix B.

	Bandwidth ± 3		Bandwidth ± 6		Bandwidth ± 9	
	Non-SET 50	SET 50	Non-SET 50	SET 50	Non-SET 50	SET 50
Number of shareholders	6,949.137	8,639.097	7,642.230	9,979.321**	8,365.348	10,043.52*
Institutional ownership (percent)	0.961	1.152	1.543	1.425	1.687	1.434
Idiosyncratic risk-taking	0.041	0.040	0.041	0.040	0.043	0.039

Table 6

Regression discontinuity analysis of monitoring and risk-taking behavior around SET 50 Index cutoff

This table presents the results from regression discontinuity analyses of the percentage of institutional ownership, number of shareholders, and level of risk-taking of firms after SET indices assignment. Panel A displays the treatment coefficients from linear regression discontinuity tests of firms within various fixed bandwidths where the treatment coefficients are estimated by the equation $Y_{it} = \alpha + \tau D_{it} + \delta_j Rank_{it} + \gamma_j D_{it} Rank_{it} + \varepsilon_{it}$. Panel B shows the treatment coefficients from nonparametric regression discontinuity tests of firms within various fixed bandwidths where the treatment coefficients are estimated by the equation $Y_{it} = \alpha + \tau D_{it} + \sum_{j=1}^{3} \delta_j Rank_{it}^{j} + \sum_{j=1}^{3} \gamma_j D_{it} Rank_{it}^{j} + \varepsilon_{it}$. In both regression equations, D is a dummy variable, taking value 1 if the firm is included in SET 50 Index and zero otherwise, and $Rank$ is the distance of firm's three-month average market capitalization ranking within SET 100 Index from the SET 50 Index cutoff. *, **, and *** indicate that the treatment coefficients are significantly different from zero at a significance level of 10%, 5%, and 1% respectively. Variables are described in Appendix B.

Panel A: Treatment coefficient from linear regression discontinuity analysis of monitoring and risk-taking behavior around SET 50 Index cutoff

	Bandwidth ± 3	Bandwidth ± 6	Bandwidth ± 9	Bandwidth ± 12	Bandwidth ± 15
Number of shareholders	4,285.665**	3,305.695*	2,330.535	1,487.256	1,788.801
Institutional ownership (percent)	-0.063	0.489	0.088	0.087	0.072
Idiosyncratic risk-taking	-0.003	-0.001	-0.002	-0.003	-0.003

Panel B: Treatment coefficient from nonparametric regression discontinuity analysis of monitoring and risk-taking behavior around SET 50 Index cutoff

	Bandwidth ± 3	Bandwidth ± 6	Bandwidth ± 9	Bandwidth ± 12	Bandwidth ± 15
Number of shareholders	3,876.763*	4,242.131*	3,659.132**	3,103.640*	2,399.334
Institutional ownership (percent)	0.110	0.011	0.391	0.169	0.161
Idiosyncratic risk-taking	-0.007	-0.005	-0.002	-0.002	-0.002

Table 7

Mean comparison of firm characteristics around SET 50 Index cutoff

This table compares the average firm characteristics of firms within ± 3, 6, and 9 bandwidth around SET 50 Index cutoff. *, **, and *** indicate that the differences in average values are significantly different from zero at a significance level of 10%, 5%, and 1% respectively. Variables are described in Appendix B.

	Bandwidth ± 3		Bandwidth ± 6		Bandwidth ± 9	
	Non-SET 50	SET 50	Non-SET 50	SET 50	Non-SET 50	SET 50
Payout ratio (percent)	44.504	54.189*	42.366	49.556*	40.909	47.266**
Return on asset (percent)	10.476	11.346	9.443	9.974	8.468	9.518
Cash to asset (percent)	7.037	6.881	7.378	8.485	7.089	8.401
Debt to EV (percent)	28.188	28.273	32.626	31.325	33.916	33.174
Price to book ratio	2.499	2.660	2.325	2.323	2.118	2.133

Table 8

Regression discontinuity analysis of firm characteristics around SET 50 Index cutoff

This table presents the results from regression discontinuity analyses of firm characteristics after SET indices assignment. Panel A displays the treatment coefficients from linear regression discontinuity tests of firms within various fixed bandwidths where the treatment coefficients are estimated by the equation $Y_{it} = \alpha + \tau D_{it} + \delta_j Rank_{it} + \gamma_j D_{it} Rank_{it} + \varepsilon_{it}$. Panel B shows the treatment coefficients from nonparametric regression discontinuity tests of firms within various fixed bandwidths where the treatment coefficients are estimated by the equation $Y_{it} = \alpha + \tau D_{it} + \sum_{j=1}^{3} \delta_j Rank_{it}^{j} + \sum_{j=1}^{3} \gamma_j D_{it} Rank_{it}^{j} + \varepsilon_{it}$. In both regression equations, D is a dummy variable, taking value 1 if the firm is included in SET 50 Index and zero otherwise, and $Rank$ is the distance of firm's three-month average market capitalization ranking within SET 100 Index from the SET 50 Index cutoff. *, **, and *** indicate that the treatment coefficients are significantly different from zero at a significance level of 10%, 5%, and 1% respectively. Variables are described in Appendix B.

Panel A: Treatment coefficient from linear regression discontinuity analysis of post-assignment firm characteristics

	Bandwidth ± 3	Bandwidth ± 6	Bandwidth ± 9	Bandwidth ± 12	Bandwidth ± 15
Payout ratio (percent)	9.315	7.278	10.660**	8.958**	7.516*
Return on asset (percent)	0.215	-1.037	0.051	0.799	0.679
Cash to asset (percent)	1.901	-0.623	0.669	1.313	1.166
Debt to EV (percent)	-0.320	1.517	-1.752	-2.426	-1.054
Price to book ratio	-0.556	-0.362	-0.046	0.009	-0.077

Panel B: Treatment coefficient from nonparametric regression discontinuity analysis of post-assignment firm characteristics

	Bandwidth ± 3	Bandwidth ± 6	Bandwidth ± 9	Bandwidth ± 12	Bandwidth ± 15
Payout ratio (percent)	12.160	13.325*	8.591	11.416**	8.916*
Return on asset (percent)	0.811	1.178	-1.107	-0.707	0.096
Cash to asset (percent)	-0.323	1.243	-1.356	-0.780	0.063
Debt to EV (percent)	1.996	2.062	3.467	-0.802	0.010
Price to book ratio	-0.185	-0.171	-0.231	-0.037	-0.156

Table 9

Difference in firm characteristics between firms included in SET 50 and firms not included: difference-in-differences estimations

This table presents the treatment coefficients τ from difference-in-differences estimations. τ is estimated by fitting equation $Y_{it} = \alpha_i + \alpha_t + \tau D_{it} + Z'_{i,t-1}\theta + \beta Y_{i,t-1} + \varepsilon_{it}$, where D is a dummy variable, taking value 1 if the firm is included in SET 50 Index and zero otherwise. $Z'_{i,t-1}$ is a vector of firm characteristics in the period before. The variables included in the vector are described in Appendix B. $Y_{i,t-1}$ is the characteristic of interest in the period before. If the firm characteristic of interest is already included in the Z' vector, the variable $Y_{i,t-1}$ is dropped. The regressions also include both firm and time fixed effects. *, **, and *** indicate that the treatment coefficients are significantly different from zero at a significance level of 10%, 5%, and 1% respectively. Variables are described in Appendix B.

Firm characteristic	Treatment coefficient
Number of shareholders	991.833***
Institutional ownership (percent)	0.031
Idiosyncratic risk-taking	0.003
Payout ratio (percent)	2.535**
Return on asset (percent)	-0.360
Cash to asset (percent)	0.382
Debt to EV (percent)	-2.575***
Price to book ratio	0.530

Table 10

Difference in firm characteristics between firms included in SET 100 and firms not included: difference-in-differences estimations

This table presents the treatment coefficients τ from difference-in-differences estimations. τ is estimated by fitting equation $Y_{it} = \alpha_i + \alpha_t + \tau D_{it} + Z'_{i,t-1}\theta + \beta Y_{i,t-1} + \varepsilon_{it}$, where D is a dummy variable, taking value 1 if the firm is included in SET 100 Index and zero otherwise. $Z'_{i,t-1}$ is a vector of firm characteristics in the period before. The variables included in the vector are described in Appendix B. $Y_{i,t-1}$ is the characteristic of interest in the period before. If the firm characteristic of interest is already included in the Z' vector, the variable $Y_{i,t-1}$ is dropped. The regressions also include both firm and time fixed effects. *, **, and *** indicate that the treatment coefficients are significantly different from zero at a significance level of 10%, 5%, and 1% respectively. Variables are described in Appendix B.

Firm characteristic	Treatment coefficient
Number of shareholders	245.427
Institutional ownership (percent)	0.164**
Idiosyncratic risk-taking	-0.004
Payout ratio (percent)	-0.726
Return on asset (percent)	-0.369
Cash to asset (percent)	0.362
Debt to EV (percent)	-3.359***
Price to book ratio	0.158

Figure 1
Market capitalization around SET 50 Index cutoff

This graph presents 3-month average daily market capitalization at the SET indices calculation dates of firms around SET 50 Index cutoff. The horizontal axis represents the relative market capitalization ranking within SET 100 Index, with values below 50 representing SET 50 Index membership.

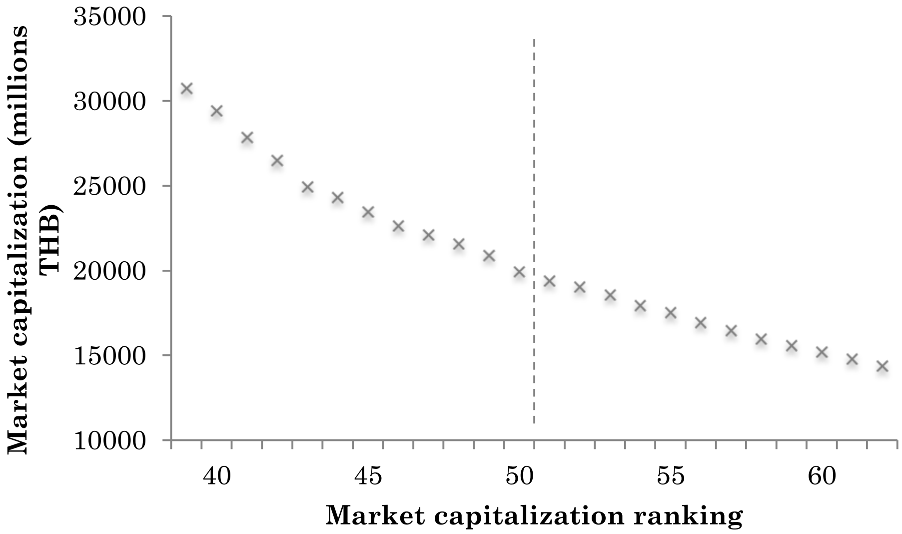


Figure 2

Institutional ownership around SET 50 Index cutoff

This graph presents the percentage of institutional ownership of firms around SET 50 Index cutoff. The horizontal axis represents the relative market capitalization ranking within SET 100 Index, with values below 50 representing SET 50 Index membership. The scatter plots represent the average percentage of institutional ownership across all years while the lines represent a third-order polynomial regression discontinuity estimates from ±12 bandwidth.

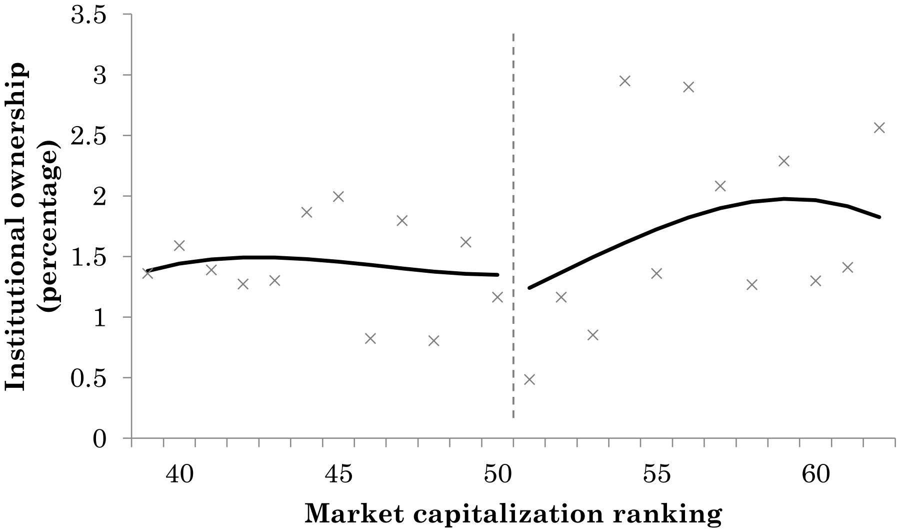


Figure 3

Number of shareholders around SET 50 Index cutoff

This graph presents the number of shareholders of firms around SET 50 Index cutoff. The horizontal axis represents the relative market capitalization ranking within SET 100 Index, with values below 50 representing SET 50 Index membership. The scatter plots represent the average number of shareholders across all years while the lines represent a third-order polynomial regression discontinuity estimates from ±12 bandwidth.

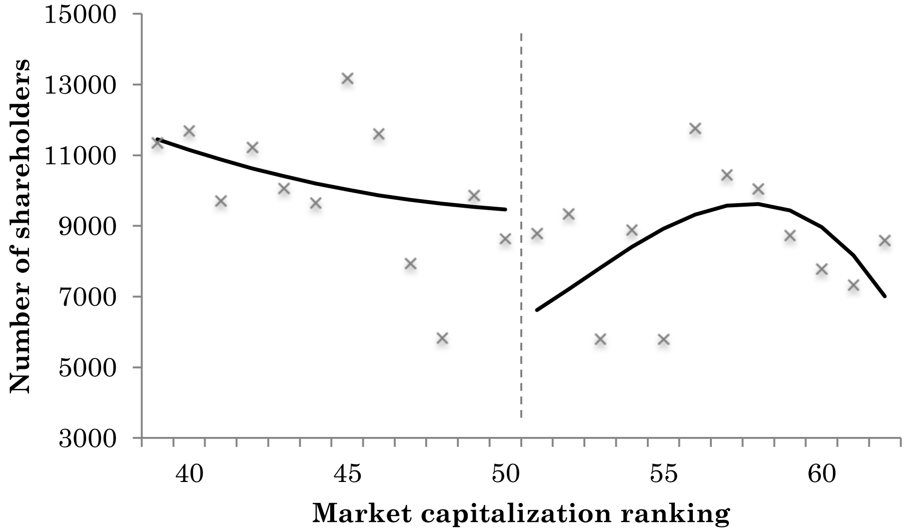


Figure 4

Idiosyncratic risk-taking around SET 50 Index cutoff

This graph presents the level of idiosyncratic risk-taking of firms around SET 50 Index cutoff. The horizontal axis represents the relative market capitalization ranking within SET 100 Index, with values below 50 representing SET 50 Index membership. The scatter plots represent the average level of idiosyncratic risk-taking across all years while the lines represent a third-order polynomial regression discontinuity estimates from ±12 bandwidth.

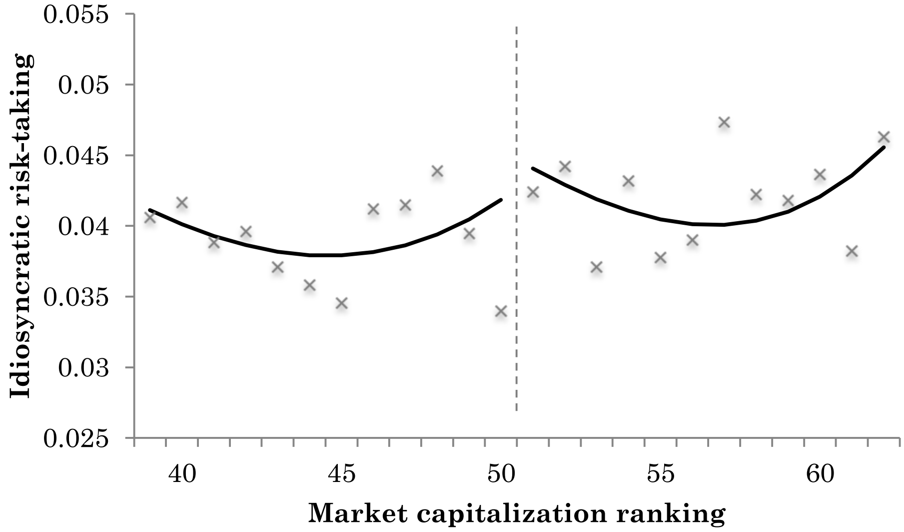
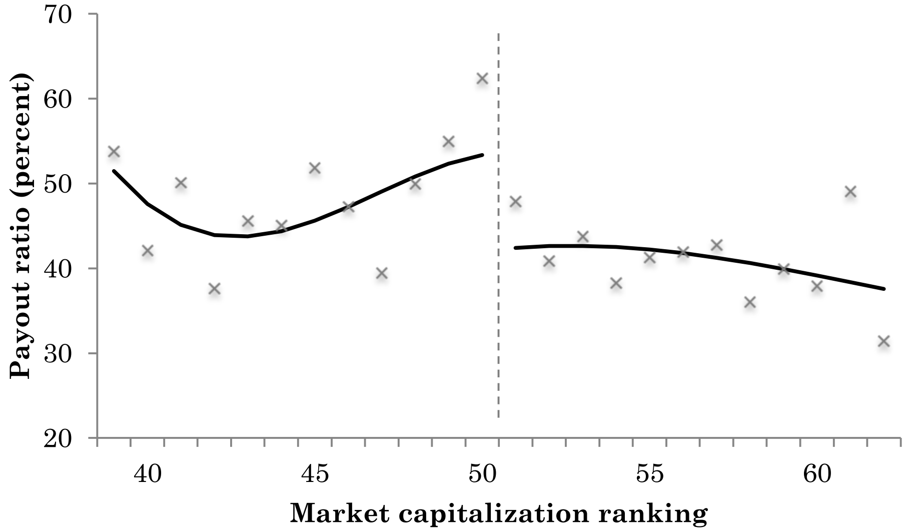


Figure 5

Payout ratio around SET 50 Index cutoff

This graph presents the payout ratio of firms around SET 50 Index cutoff. The horizontal axis represents the relative market capitalization ranking within SET 100 Index, with values below 50 representing SET 50 Index membership. The scatter plots represent the average payout ratio across all years while the lines represent a third-order polynomial regression discontinuity estimates from ±12 bandwidth.



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