

Do Index Funds Monitor?

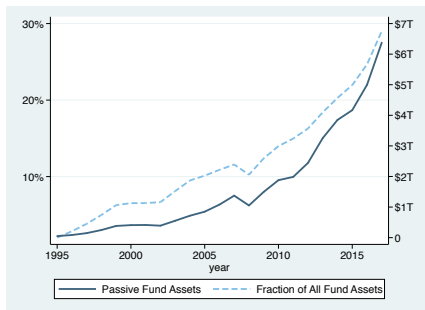
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ECGI

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The Rise of Passive Index Investing

- Active managers, on average, do not outperform
- As a result, capital in index funds has grown to > \$6 trillion
- Passively managed index funds now own 30% of assets in U.S. mutual funds and ETFs
- **What is the impact on efficiency of firms and markets?**



Research Question: do index funds monitor portfolio firms?

Research Questions

- 1 To what extent do index funds monitor?
 - Do index funds monitor differently than active funds?
- 2 Does passive investing lead to increased agency costs?
- We examine the main governance mechanisms predicted by theory:
 - 1 Voting
 - 2 Exit
 - 3 (& also engagement)

Conceptual Framework: *Should* index funds monitor?

- Principal-agent theories argue that long term investors with large positions have strong incentives to monitor
 - Index funds are largest blockholders of most large U.S. corporations (Grossman-Hart 1980; Shleifer-Vishny 1986)
 - Since they can hardly exit – more incentive to monitor and use voice (Fisch et al 2018)

Conceptual Framework: *Should* index funds monitor?

- But index funds may have weak incentives to monitor:
 - Hold 1000s of stocks → limited resources *pro rata*
 - Unclear benefits from improving governance
 - Free-rider problem (Bebchuk et al. 2018)

Heated debate in the empirical literature

- ① Boone & White (2015), Appel, Gormley & Keim (2016), Crane, Michenaud & Weston (2016), others:
 - More passive ownership → better governance
 - More independent directors, disclosure, dividends
 - Less poison pills, dual class shares
 - Index funds are “Closet Activists”
 - ② Schmidt & Fahlenbrach (2017), Brav, Jiang, and Li (2018):
 - More passive ownership → worse governance
 - Worse M&A
 - Negative returns on appointment of directors
 - Index funds side with managers in proxy contests
- **Who is right?**
 - **How do these effects occur?**

Research Question: do index funds monitor portfolio firms?

Preview of Results

- We find index funds cede power to firm managers
 - ① Significantly more likely to vote with managers
 - Index funds are 12.5 percentage points more likely to vote with managers compared to active funds
 - Across a wide range of vote categories
 - ② Significantly less likely to exit
 - Index funds (surprisingly) do exit, up to 16% of their portfolio per year
 - Unlike active funds, do not use exit to enforce good governance
 - ③ No evidence that they engage

We combine CRSP, ISS, and Russell data

- We combine data from CRSP, ISS, and Russell from 2003 to 2017
- ① ISS data: 59,461,743 *individual* fund votes on 313,635 agenda items for 6,470 firms
- ② We merge with the CRSP mutual fund database
 - 3,642 funds and 31,377 fund-years with equity focus and > \$10m in AUM
 - “Index funds” are those with fund flag “D” (both open-ended mutual funds and ETFs)
 - “Active funds” are all others

Identifying the Effect of Index Investing

Problem: Fund holdings are endogenous:

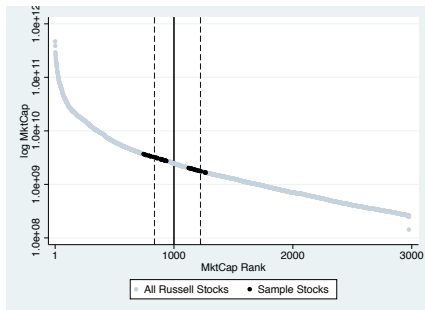
- ① Firm characteristics jointly affect ownership and governance (*omitted variable*)
- ② Different firm policies attract different types of investors (*reverse causality*)
- ③ We never observe voting or exit if funds *choose* not to hold a firm (*selection bias*)

Solution

- 1 & 2: We use panel regressions with fixed effects
- 3: We compare stocks on either side of the cutoff between Russell 1000 and 2000 using a diff-in-diff regression
 - And we include a Heckman correction

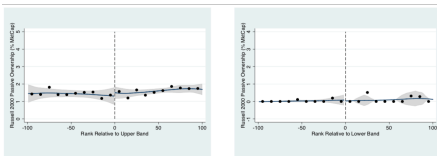
Overview of our Russell methodology

- Bottom line: Compare firms that are similar in every way EXCEPT index assignment

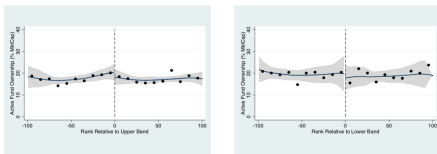


- We implement a Heckman model, with Russell index switching as a shock to the probability that fund i owns firm j
- Details are in the paper and the Appendix

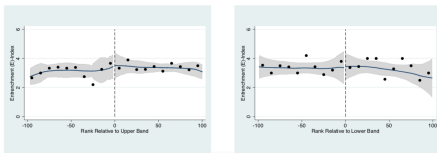
Balance Tests support identification assumptions



(a) Pretreatment ownership by Russell 2000 index funds



(b) Pretreatment ownership by active funds



(c) Pretreatment governance (E-Index)

Index Assignment Changes Passive Ownership

- First step: index assignment matters
- Stocks that switch to the R2000 experience a large increase in index fund ownership

| | (1) | (2) | (3) | (4) | (5) | (6) |
|--|---------------------------|---------------------------|-----------------------------|--------------------|------------------|---------------------|
| | $PassiveOwn_{jt}^{R2000}$ | $PassiveOwn_{jt}^{R1000}$ | $PassiveOwn_{jt}^{S\&P500}$ | $PassiveOwn_{jt}$ | $ActiveOwn_{jt}$ | $TotalFundOwn_{jt}$ |
| $R1000 \rightarrow R2000_j \times$ $PostAssignment_t$ | 1.45*** (0.10) | -0.18*** (0.01) | -0.03** (0.01) | 1.03*** (0.24) | -0.06 (0.36) | 0.97* (0.48) |
| $R2000 \rightarrow R1000_j \times$ $PostAssignment_t$ | -1.34*** (0.08) | 0.17*** (0.02) | 0.02*** (0.01) | -0.86*** (0.14) | -0.06 (0.27) | -0.93** (0.34) |
| Observations | 4,392 | 4,392 | 4,392 | 4,392 | 4,392 | 4,392 |
| Adjusted R^2 | 0.468 | 0.474 | 0.361 | 0.674 | 0.569 | 0.582 |
| Years | 2004-2017 | 2004-2017 | 2004-2017 | 2004-2017 | 2004-2017 | 2004-2017 |
| Cohorts | 2007-2015 | 2007-2015 | 2007-2015 | 2007-2015 | 2007-2015 | 2007-2015 |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Firm \times Cohort FE | Yes | Yes | Yes | Yes | Yes | Yes |

Does Index Ownership Affect Governance?

- Results show index membership changes ownership by index funds
- So what? Does this matter?
- Theory suggests separation of ownership and control leads to agency conflicts (Berle and Means (1932))

– Adam Smith, *The Wealth of Nations*

“The directors of such [joint-stock] companies, however, being the managers rather of other people’s money than of their own, it cannot well be expected, that they should watch over it with the same anxious vigilance with which the partners in a private copartnery frequently watch over their own....”

- We examine voting and exit behavior

Simple summary stats for voting

| managers | | Index funds | | | | Active Funds | | | | Difference | |
|-------------|------------------|-------------|-------|---------|------|--------------|-------|---------|------|------------|------------|
| Recommend | ISS Recommend | Yes | No | Abstain | DNV | Yes | No | Abstain | DNV | PctYes | N |
| All | | 90.4% | 6.2% | 3.2% | 0.2% | 89.4% | 7.1% | 3.1% | 0.4% | 1.0% | 23,221,799 |
| Consensus | | | | | | | | | | | |
| Yes | Yes | 95.6% | 2.8% | 1.4% | 0.1% | 96.0% | 2.6% | 1.1% | 0.3% | -0.4% | 20,669,238 |
| No | No | 4.2% | 84.6% | 8.8% | 2.4% | 5.1% | 82.7% | 10.7% | 1.5% | -0.9% | 362,447 |
| Contentious | | | | | | | | | | | |
| Yes | No | 54.3% | 19.0% | 24.9% | 1.8% | 41.9% | 25.1% | 30.4% | 2.5% | 12.4% | 1,426,904 |
| No | Yes | 41.5% | 53.5% | 4.9% | 0.1% | 47.7% | 46.0% | 6.0% | 0.3% | -6.2% | 763,210 |

- On both kinds of **consensus** items, no difference in voting
- Makes sense! Everyone agrees what to do, so no costly effort is necessary

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- On both kinds of **consensus** items, no difference in voting
- Makes sense! Everyone knows what to do, so no costly effort is necessary

Simple summary stats for voting

| managers | | ISS | Index funds | | | | Active Funds | | | | Difference | |
|-------------|-----------|-----|-------------|-------|---------|------|--------------|-------|---------|------|------------|------------|
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- But on both kinds of **contentious** items, index funds are more likely to vote with managers
- And active funds abstain **more** (is abstain = “soft no”? Bebcuk et al (2017))

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- But on both kinds of **contentious** items, index funds are more likely to vote with managers
- And active funds abstain **more** (is abstain = “soft no”? Bebchuk et al (2017))

Summary Stats \implies Voting Differences

- 1 On **consensus** items, no difference in voting
 - 2 On both kinds of **contentious** items, index funds are more likely to vote with managers
- From a principal-agent perspective, this means index funds cede power to managers

Vanguard 2018:

"We will give substantial weight to the recommendations of the company's board, absent guidelines or other specific facts that would support a vote against management."

Index funds vote with managers

- Of course, concerned about endogeneity
 - So we examine regressions (OLS and DiD+Heckman)
 - Across all specifications, we find the same result

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| | <i>VotedWithMgmt</i> | <i>VotedWithMgmt</i> | <i>VotedWithMgmt</i> | <i>VotedWithMgmt</i> | <i>VotedWithMgmt</i> | <i>VotedWithMgmt</i> |
| <i>IndexFund_{it}</i> | 0.125*** (0.025) | 0.126*** (0.024) | 0.150*** (0.030) | 0.150*** (0.030) | 0.084*** (0.032) | 0.079*** (0.029) |
| <i>InverseMillsRatio_{ijt}</i> | | | | | -0.114 (0.040) | -0.111 (0.034) |
| <i>ExpenseRatio_{it}</i> × <i>IndexFund_{it}</i> | | -0.238*** (0.073) | | -0.209** (0.085) | | -0.209** (0.084) |
| <i>ExpenseRatio_{it}</i> × <i>ActiveFund_{it}</i> | | 0.021 (0.046) | | 0.071 (0.060) | | 0.071 (0.060) |
| Model | OLS | OLS | OLS | OLS | Heckman | Heckman |
| Sample Firms | All | All | Russell | Russell | Russell | Russell |
| Observations | 2,187,598 | 2,187,598 | 189,319 | 189,319 | 189,319 | 189,319 |
| Adjusted R ² | 0.074 | 0.083 | 0.076 | 0.084 | 0.076 | 0.084 |
| Firm FE | Yes | Yes | No | No | No | No |
| Firm × Cohort FE | No | No | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |

Voting differs by the type of agenda item

| | (1) | (2) | (3) | (4) |
|------------------------------|--|--------------------------------------|------------------------------------|--------------------------------------|
| | Item Type | | | |
| | Board of Directors <i>VotedwithMgmt</i> | Compensation <i>VotedwithMgmt</i> | Disclosure <i>VotedwithMgmt</i> | Entrenchment <i>VotedwithMgmt</i> |
| <i>IndexFund_i</i> | 0.132*** (0.029) | 0.127*** (0.028) | 0.095*** (0.029) | 0.116*** (0.026) |
| Observations | 1,173,740 | 44,953 | 106,314 | 77,189 |
| Adjusted R^2 | 0.086 | 0.057 | 0.021 | 0.101 |
| Firm FE | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes |

- Index funds side with firm management, across many types of agenda items
- See also Brav, Jiang, and Li (2018) on proxy battles

Voting results are clear

- Index funds are 12.5% more likely to vote with managers
 - Across many specifications. Across agenda items relating to compensation, disclosure, board of directors, **entrenchment**
 - At the fund family level, same results: As the family has more passive AUM, more likely to vote with managers
- Within index funds: As fund fees decrease, the fund is more likely to vote with managers
 - Consistent with less resources and less incentive to monitor (Lewellens (2019))
- All of the tests & methodologies point to the same conclusion
 - ① Index funds have less incentive to monitor
 - ② Thus, they monitor less
 - ③ This cedes power to managers

Is this just a Voting Effect?

- Results show index funds are more likely to vote with managers
- Possible that funds use other channels to affect governance (e.g., Edmans et al. (2018))
 - They could sell their position (exit)
 - They could meet with managers (engagement)
- Accordingly we examine these other channels

Fund Exit: Summary Stats

- We measure fund exit using fund holdings data
 - $Exit=1$ if a fund holds a firm in year t , but not in year $t + 1$
 - Conservative definition of exit
- We find that each year, on average:
 - Active funds exit 36 (33%) of 114 positions
 - Russell 2000 funds exit 290 (16%) of 1789 positions; 67 (4%) are *voluntary*

Index funds exit less: No strategic use of exit

| | (1) | (2) | (3) | (4) | (5) | (6) |
|--|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| | <i>VoluntaryExit</i> | <i>VoluntaryExit</i> | <i>VoluntaryExit</i> | <i>VoluntaryExit</i> | <i>VoluntaryExit</i> | <i>VoluntaryExit</i> |
| <i>IndexFund_i</i> | -0.179*** (0.012) | -0.138*** (0.012) | -0.174*** (0.015) | -0.136*** (0.014) | -0.185*** (0.015) | -0.141*** (0.014) |
| <i>InverseMillsRatio_{ijt}</i> | | | | | -0.021*** (0.005) | -0.008** (0.004) |
| <i>ActiveFund_i × LostVote_{ijt-1}</i> | | 0.009** (0.004) | | 0.005 (0.008) | | 0.005 (0.006) |
| <i>IndexFund_i × LostVote_{ijt-1}</i> | | -0.004 (0.004) | | -0.007 (0.007) | | -0.007 (0.007) |
| Model | OLS | OLS | OLS | OLS | Heckman | Heckman |
| Sample Firms | All | All | Russell | Russell | Russell | Russell |
| Observations | 4,192,281 | 2,211,016 | 452,902 | 282,738 | 452,902 | 282,738 |
| Adjusted R^2 | 0.093 | 0.074 | 0.072 | 0.058 | 0.072 | 0.058 |
| Firm FE | Yes | Yes | No | No | No | No |
| Firm × Cohort FE | No | No | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |

- Active funds are more likely to exit after a lost vote
- Index funds exit less, and do not exit after a lost vote

What about behind the scenes engagement?

- Results show index funds are (i) more likely to vote with managers and (ii) less likely to exit
- Possible that index funds “engage” with firm managers to get good governance
 - Vote with managers because they already convinced managers to put the items they wanted on ballot
- We test for engagement in three ways
 - Examine management vs. shareholder proposals
 - Examine whether different items on ballot
 - Examine 13D vs. 13G filings

Contentious proposals by managers versus shareholders

| | (1) | (2) | (3) | (4) | (5) | (6) |
|------------------------------|----------------------|----------------------|----------------------|-----------------------|---------------------|-------------------|
| | Management Proposals | | | Shareholder Proposals | | |
| | <i>VotedYes</i> | <i>VotedNo</i> | <i>Abstained</i> | <i>VotedYes</i> | <i>VotedNo</i> | <i>Abstained</i> |
| <i>IndexFund_i</i> | 0.144*** (0.031) | -0.050*** (0.011) | -0.085*** (0.020) | -0.092*** (0.023) | 0.103*** (0.022) | -0.009 (0.008) |
| Observations | 1,408,736 | 1,408,736 | 1,408,736 | 778,846 | 778,846 | 778,846 |
| Adjusted R^2 | 0.079 | 0.232 | 0.218 | 0.089 | 0.071 | 0.055 |
| Firm FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |

- Even if index funds engage with managers, it cannot explain their voting on shareholder proposals, which is equally strong
- Again, index funds cede authority to managers

Changes in the Supply of Agenda Items

| | (1) | (2) | (3) | (4) | (5) | (6) |
|--|------------------------------|--------------------------------|---------------------------------|------------------------------------|-------------------------------------|-----------------------------------|
| | <i>NumItems_{jt}</i> | <i>NumShrProp_{jt}</i> | <i>NumMgmtProp_{jt}</i> | <i>FracISSAgainst_{jt}</i> | <i>FracMgmtAgainst_{jt}</i> | <i>FracConsensus_{jt}</i> |
| <i>R1000</i> → <i>R2000_j</i> × <i>PostAssignment_t</i> | 0.02 (0.34) | -0.02 (0.07) | 0.05 (0.32) | -0.01 (0.02) | 0.003 (0.004) | 0.012 (0.017) |
| <i>R2000</i> → <i>R1000_j</i> × <i>PostAssignment_t</i> | -0.28 (0.37) | 0.001 (0.030) | -0.29 (0.37) | -0.00 (0.01) | 0.004 (0.003) | -0.00 (0.013) |
| Observations | 3,726 | 3,726 | 3,726 | 3,726 | 3,726 | 3,726 |
| Adjusted <i>R</i> ² | 0.614 | 0.119 | 0.623 | 0.430 | -0.031 | 0.431 |
| Firm × Cohort FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |

- Recall: Index switching changes index fund holdings
- Yet there is **zero change** in the number or type of agenda items at the annual meeting
- Inconsistent with index funds engaging behind the scenes

Blockholding Disclosures: Schedule 13D versus 13G

| | (1) Filed 13D | (2) Filed 13D | (3) Filed 13D |
|------------------------------------|-------------------|-------------------|----------------------|
| <i>FracAUMPassive_{jt}</i> | -1.13** (0.48) | -1.05** (0.46) | -1.15** (0.49) |
| <i>logAUM_{jt}</i> | | -0.052 (0.042) | |
| <i>numFilings_{jt}</i> | | | 0.00028 (0.00032) |
| Model | Probit | Probit | Probit |
| Observations | 920 | 920 | 921 |
| Pseudo R^2 | 0.018 | 0.018 | 0.018 |

- Blockholding disclosure via form 13D signals an intent to engage (recorded at the fund-family level)
- Index fund families are saying: We do not intend to engage
- Subsample analysis suggests index funds **never** file 13D

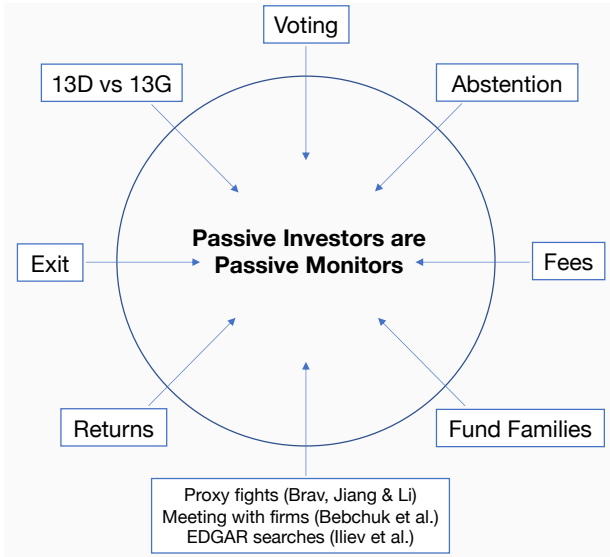
Conclusion: Passive funds are passive monitors

- We directly examine voice and exit by index funds
- Index funds are **weaker monitors** than active funds:
 - ① Index funds vote with firm managers
 - ② Across agenda items, and regardless who proposed
 - ③ Index funds with lower fees vote more passively
 - ④ More passive fund families vote more passively
 - ⑤ Index funds are less likely to exit
 - ⑥ No evidence that index funds engage with managers
- All our results suggest that index funds cede power to firm managers

Contemporaneous research

- Bebchuk, Hirst (WP): Index funds do not meet with the vast majority of their portfolio firms
- Brav, Jiang, Li (WP): Index funds are more likely than active funds to side with firm management in proxy contests
- Iliev, Kalodimos, Lowry (WP): Index funds do not look up their portfolio firms on EDGAR

Conclusion: Passive funds are passive monitors

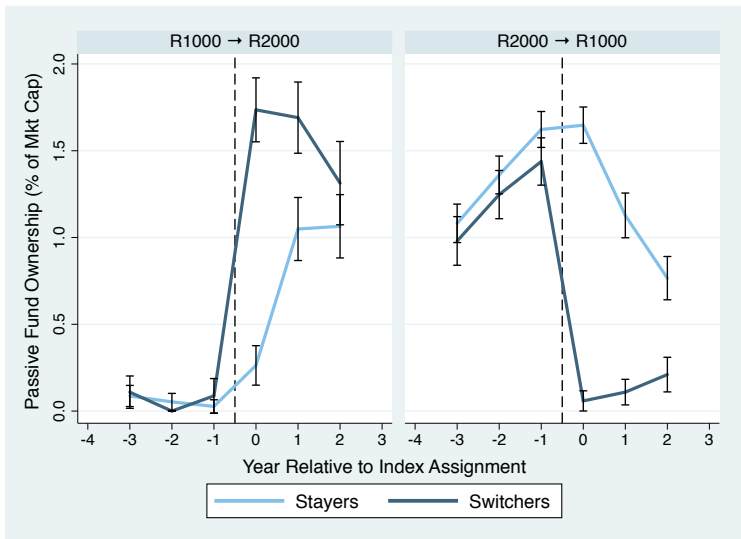


Appendix

Fund Votes and Announcement Returns

| | (1) | (2) | (3) |
|--|------------------------------|------------------------------|------------------------------|
| | <i>DailyRtn_{ik}</i> | <i>DailyRtn_{ik}</i> | <i>DailyRtn_{ik}</i> |
| <i>VotedYes_{ik} × IndexFund_i</i> | 0.0006* | 0.0014 | 0.0021 |
| | (0.0003) | (0.0014) | (0.0014) |
| <i>VotedYes_{ik} × IndexFund_i × ItemPassed_k</i> | -0.0006* | -0.0017 | -0.0017 |
| | (0.0003) | (0.0014) | (0.0014) |
| <i>VotedYes_{ik} × ActiveFund_i</i> | -0.0002 | 0.0004 | -0.0005 |
| | (0.0003) | (0.0013) | (0.0013) |
| <i>VotedYes_{ik} × ActiveFund_i × ItemPassed_k</i> | 0.0000 | -0.0008 | -0.0007 |
| | (0.0003) | (0.0014) | (0.0014) |
| <i>InverseMillsRatio_{ijt}</i> | | | 0.0035*** |
| | | | (0.0008) |
| Observations | 22,727,613 | 2,596,144 | 2,596,144 |
| Adjusted <i>R</i> ² | 0.175 | 0.191 | 0.191 |
| Main Effects | Yes | Yes | Yes |
| Firm FE | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes |

Switching: Parallel pre-trends in ownership



Heckman Correction

$$\begin{aligned}
 \text{Observed}_{ijt} = & \text{Probit}(\tau \text{IndexFund}_i \\
 & + \xi_1 R1000 \rightarrow R2000_j \times \text{Post}_t \times \text{IndexFund}_i \\
 & + \xi_2 R2000 \rightarrow R1000_j \times \text{Post}_t \times \text{IndexFund}_i \\
 & + \mu_1 R1000 \rightarrow R2000_j \times \text{Post}_t \\
 & + \mu_2 R2000 \rightarrow R1000_j \times \text{Post}_t \\
 & + \phi_j + \chi_t + \nu_{ijt})
 \end{aligned} \tag{1}$$

$$\begin{aligned}
 Y_{ijt} = & \beta \text{IndexFund}_i + \alpha \text{InverseMillsRatio}_{ijt} \\
 & + \delta_1 R1000 \rightarrow R2000_j \times \text{Post}_t \\
 & + \delta_2 R2000 \rightarrow R1000_j \times \text{Post}_t \\
 & + \lambda_j + \kappa_t + \epsilon_{ijt}
 \end{aligned} \tag{2}$$

Heckman Observation Equation

| | (1) <i>Observed_{ijt}</i> |
|---|--------------------------------------|
| <i>IndexFund_i</i> | 0.696*** (0.057) |
| <i>R2000</i> → <i>R1000_j</i> × <i>PostAssignment_t</i> | 0.071*** (0.021) |
| <i>R1000</i> → <i>R2000_j</i> × <i>PostAssignment_t</i> | -0.224*** (0.025) |
| <i>R2000</i> → <i>R1000_j</i> × <i>PostAssignment_t</i> × <i>IndexFund_i</i> | -0.055* (0.032) |
| <i>R1000</i> → <i>R2000_j</i> × <i>PostAssignment_t</i> × <i>IndexFund_i</i> | 0.067*** (0.024) |
| Model | Probit |
| Observations | 6,586,669 |
| Pseudo R^2 | 0.054 |
| Firm × Cohort FE | Yes |
| Year FE | Yes |

No *pre-treatment* difference on fund ownership

| | (1) <i>PassiveOwn</i> ^{R2000} | (2) <i>PassiveOwn</i> ^{R1000} | (3) <i>PassiveOwn</i> ^{S&P500} | (4) <i>ActiveOwn</i> | (5) <i>TotalFundOwn</i> |
|---|---|---|--|-------------------------|----------------------------|
| <i>R1000</i> → <i>R2000</i> _{<i>j</i>} | -0.02 (0.08) | 0.00 (0.02) | -0.02 (0.03) | -1.28 (3.07) | -1.32 (3.09) |
| <i>R1000</i> → <i>R2000</i> _{<i>j</i>} | -0.07 (0.12) | 0.01 (0.01) | -0.00 (0.01) | 2.17 (1.55) | 2.10 (1.60) |
| Observations | 732 | 732 | 732 | 732 | 732 |
| Adjusted R-squared | 0.731 | 0.831 | 0.077 | 0.045 | 0.052 |
| Window | 100 | 100 | 100 | 100 | 100 |
| Cohort | 2007-2015 | 2007-2015 | 2007-2015 | 2007-2015 | 2007-2015 |
| Control Fn Degree | 2 | 2 | 2 | 2 | |
| Cohort × Band FE | Yes | Yes | Yes | Yes | Yes |

No *pre-treatment* difference on governance measures

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|--------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| | E-Index | S/H Chg Bylaws | Supmaj. BusComb | Supmaj. Charter | Poison Pill | Conf. Vote | Cumul. Vote |
| <i>R</i> 1000 → <i>R</i> 2000; | 0.34 (0.35) | 0.05 (0.07) | 0.04 (0.14) | 0.14 (0.15) | -0.01 (0.11) | 0.15 (0.11) | 0.02 (0.11) |
| <i>R</i> 2000 → <i>R</i> 1000; | -0.29 (0.38) | -0.07 (0.10) | 0.02 (0.14) | -0.18 (0.17) | 0.15 (0.14) | -0.02 (0.08) | -0.07 (0.13) |
| Observations | 365 | 365 | 365 | 365 | 365 | 365 | 365 |
| Adjusted R-squared | 0.016 | -0.010 | -0.007 | -0.021 | 0.011 | -0.028 | -0.019 |
| Window | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Cohort | 2007-2015 | 2007-2015 | 2007-2015 | 2007-2015 | 2007-2015 | 2007-2015 | 2007-2015 |
| Control Fn Degree | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cohort × Band FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes |