# The Investment Behavior of State Pension Plans

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**Abstract**: This paper provides evidence on the investment behavior of 20 state pension plans that actively manage their own equity portfolios. We find that while these states tend to hold a diversified portfolio that approximates the overall market, they nonetheless substantially over-weight the holdings of stocks of companies that are headquartered in-state. The extent of this over-weighting of within-state stocks by state pension plans is three times larger than that of other institutional investors. We explore three possible reasons for this in-state bias, including familiarity bias, information-based investing, and non-financial/political considerations. State boundaries are important for predicting state pension plan holdings – while there is a significant preference for instate stocks, there is no similar tilt toward holding stocks from neighboring stocks. We find evidence that states are able to generate excess returns through their in-state investment activities, particularly among smaller stocks in the primary industry in the state. However, we also find evidence that is at least suggestive of political influence playing a role in the stock selection process, as state pension plans of corrupt states are more likely to hold within-state stocks. The difference in performance between within-state and out-of-state stock investments is strongest for the state pension plans located in more corrupt states.

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**Key Words**: Public Pensions, Portfolio Choice, In-State Bias, Corruption

## 1. Introduction

By nearly any measure, state and local pension plans are important institutions in the U.S. economy. As measured in dollars, state and local pension fund assets amounted to over $2.3 trillion in 2006 (Munnell et al 2008). Over 20 million Americans participate in these public plans, 16 million as contributors and 4 million as beneficiaries. Because the responsibility for funding these defined benefit (DB) plans lies with the sponsoring government, even taxpayers that are not employed in the public sector have a stake in how these pension funds are managed. As of the year 2002, these public pension plans accounted for approximately 1/6 of the ownership of the U.S. stock market.[1] As a result, the investment decisions of these pension systems are of substantial interest.

While most state and local plans outsource their asset management activities to outside money managers, just over a tenth of the state plans internally manage their own equity portfolios. As these tend to be the larger state plans, these internally managed equity portfolios comprise just under half of total state pension plan assets. This raises a natural question of why these large pension funds choose to invest on their own and what implications this decision has for their portfolio choice and investment performance.

In this paper, we reconstruct the detailed equity portfolios of the 20 large state plans that, for at least part of our sample period, managed their own U.S equity investments. This data construction is made possible due to the legal requirement that "institutional investment managers who exercise investment discretion over $100 million or more in Section 13(f) securities must report their holdings on Form 13F with the SEC."[2]

[1] Source Wilshire 2004 Report on State Retirement Systems and authors' calculations.
[2] http://www.sec.gov/answers/form13f.htm

Effectively, this means that all public pension funds that manage their own stock investments worth at least $100 million must file a detailed 13F report with the SEC that includes for each asset the name, CUSIP number, number of shares and value of all securities held on the last day of the reporting period. The 13F data can then be aggregated up to create the entire equity portfolio held by these state funds on each quarterly reporting date, and these aggregate amounts can then be compared with independent sources of data on equity holdings of these plans to provide assurance that we are accurately measuring the plan's equity holdings. With this unique data, we can then explore how these states manage their own U.S. equity portfolios.

Overall, we find that the state-managed equity portfolios hold a broadly diversified portfolio of stocks. Relative to the value weighted index of all U.S. equities, these state-managed plans overweight large (i.e., S&P 500) stocks. Because the portfolios are broadly diversified, their performance tends to be highly correlated with broad market indices.

However, we also find strong evidence that these plans over-weight the stocks of companies that are headquartered in the state. The size of this in-state bias is both economically and statistically significant: on average, in-state stocks represent 9.7 percent of these states' pension portfolios, versus a 5.6 percent weighting that they would receive if the state plan was invested to mimic the overall value-weighted market portfolio – leading to a within-state bias of 76%. This tilt toward within-state stocks is much larger than that found for institutional money managers in general. Baik, Kang, and Kim (2009) examine the holdings of all institutional money managers that file form 13F (e.g., mutual fund managers, independent investment advisers, insurance companies, banks, our 20 pension fund managers, etc.) and find that in aggregate institutional managers have a within-state bias in their holdings of 24% (i.e., their

within-state holdings are 8.2 percent of their portfolio, this share would be 6.6% if they invested in the market).

The within-state bias finding is particularly interesting given that the intuition of standard portfolio theory would suggest that, all else equal, state governments should optimally *under*-weight in-state stocks rather than over-weight them, at least to the extent that a state's economic activity, tax revenue and the income of state residents is positively correlated with the performance of in-state stocks. For example, if the economy of California is highly correlated with the performance of the high tech industry, then standard tax and/or consumption smoothing models would lead California to under-weight tech stocks in order to ensure that the pension does not lose value at precisely the same time that California is experiencing economic and fiscal pressures. To over-weight in-state stocks is analogous to an individual investing in the stock of her own employer: doing so increases the correlation between stock performance and income and thus increases, rather than decreases, *overall* portfolio risk. Indeed, we find, controlling for year and state effects, that the return on the stock investments in a state pension plan is strongly correlated with growth in state tax revenue over the next year.

Given the intuition that weighs against an in-state bias, and the potential costs of this lack of diversification, why might states do this? We explore three reasons. The first is *familiarity* bias, or put simply, the tendency for people and institutions to invest in what they know (Huberman, 2001).[3] A key feature of familiarity bias is that it is not information-based, i.e., investing in the familiar does not lead to excess returns. If local investing induces a positive correlation between the state's economy and its pension fund performance while delivering no excess returns, then

[3] Other examples of familiarity bias include the home bias puzzle, i.e., the tendency of citizens of countries to over-invest in stocks from their own country (e.g., French and Poterba, 1991), as well as Bernartzi's (2001) finding that 401(k) participants in general overweight their investment in employer stock but companies with high ownership of employer stock in their 401(k) plan do not outperform companies with lower concentrations of ownership in employer stock.

the citizens of the state would experience a welfare loss as a result of this in-state investment bias because of the extra risk involved (i.e., when the pension fund is performing poorly, state tax revenue is also in decline).

A second possible reason for the in-state bias is that the officials making the investment decisions have an *information advantage* with regard to in-state stocks. Such an information advantage to local investors has been found in many other contexts, including institutional money managers such as mutual fund managers and investment advisers (e.g., Coval and Moskowitz, 2001, and Baik, Kang, and Kim, 2009), individual investors (e.g., Ivkovich and Weisbenner, 2005), equity analysts (e.g., Malloy, 2005, and Bae, Stulz, and Tan, 2008), and "block" acquirers of corporate shares (Kang and Kim, 2008). The key distinction between the "familiarity" explanation and the "locality" explanation is that the latter implies excess returns while the former does not.

A third possible explanation is that state pension plan investment allocations are affected by non-financial / political considerations. The first two explanations are typically distinguished on the basis of whether the returns on local (or in this case, in-state) investments outperform non-local investments. It is worth noting that these three explanations are not mutually exclusive, and all three could contribute to the overweighting of within-state stocks.

Our evidence is supportive of an information-based explanation and is not consistent with broad-based familiarity tied to geography or industry. For example, while state pension plans overweight within-state stocks by a large margin, they underweight the stocks of firms located in neighboring states to the same extent they do firms located in more distant states – so "familiarity" seems to end at the state border. Further, while state pension fund managers invest disproportionately in the within-state stocks in the state's primary industry (e.g., energy for

Texas, finance for New York, business equipment/computers for California), they do not favor out-of-state stocks in this same dominant home-state industry.

To test for the presence of information-based investing, we analyze the subset of the state pension plans' portfolio where we might expect within-state investors to have an informational advantage over non-local investors. Following Ivkovich and Weisbenner (2005), we examine the return to investments in small stocks that are not a member of the S&P 500 (and thus do not have the same level of national attention) and particularly the stock of small firms that are a member of the state's primary industry. We find that state pension fund managers are able to deliver excess returns (as measured by the "alpha" in the finance literature's standard "four-factor" model) by investing in small, in-state stocks, especially those that are in the state's largest industry. Indeed, we find that among non-S&P 500 firms in a state's largest industry (as measured by the industry's share of total market capitalization among all in-state firms), state pension fund investment managers are able to outperform the out-of-state small firms in the same industry by 6.6 percentage points per year (controlling for the underlying systematic risk of the investments). We also find that among the stocks of small firms in the state's largest industry, the stocks that the pension fund holds outperform those that it chooses not to hold by 7.8 percentage points per year, whereas no significant return difference exists between out-of-state firms that the state invests in versus those it does not. Thus, at least some of the active-management of our sample of state pension plans that manage their own assets results in some information-advantaged holdings.

While the evidence is consistent with their being an information-based rationale for overweighting in-state stocks, we also find some evidence that is suggestive of political factors playing a role. Following Glaeser and Saks (2006), we use an independent index of political

corruption to categorize our state pension plans as belonging to high, medium, or low-corruption states. We also obtained gubernatorial campaign contribution data from Institute on Money in State Politics and gubernatorial election data from Polidata. Both of these datasets provide data at the county level, allowing us to link county-level campaign contributions and electoral outcomes to the county where a firm is headquartered. We find evidence that is at least suggestive of political influence playing a role in the stock selection process: state pension plans of corrupt states are more likely to hold within-state stocks, and state plans are more likely to hold stocks headquartered in counties that accounted for a larger share of campaign contributions given to the governor in the last election (with a negative interaction effect). Interestingly, the difference in performance between within-state and out-of-state stock investments is strongest for the state pension plans located in more corrupt states.

This paper proceeds as follows. Section 2 highlights the prior literatures on state pension plans and their investment behavior as well as the literature in finance on local investing. Section 3 documents the U.S. equity holdings of state pension plans that decide to manage their own stock investments and documents a strong instate-investment bias. Implications and Extensions of the within-state bias are discussed in Section 4. Section 5 offers conclusions and extensions.

## 2. Prior Literatures on State Pension Plans and Local Investing

### *2.1 State Pension Plan Investment Behavior*

Despite the importance of state and local plans, the empirical literature analyzing their investment behavior is rather small, a fact that is primarily due to limited data availability. Coronado, Engen, and Knight (2003) provide evidence that public pension plans earned a lower

rate of return than private plans in 1998. However, it is unclear from their analysis how much of this under-performance is due to differences in risk that arise from different allocations across broad asset classes, and how much of it is due to inferior investment selection abilities within an asset class. Munnell & Sunden (2001) discuss that in the early 1980s, some public plans sacrificed returns for "social considerations," but that plan managers became increasingly sophisticated and (at the time of their study) performed on par with their private sector counterparts. Useem and Mitchell (2000) provide evidence that governance policies – most notably independent performance evaluations – influences asset allocation at broad levels, such as the mix of equity and fixed income investments, the share of non-U.S. assets, and whether a plan contracts externally for asset management.

Most of these early studies rely on the PenDat data, which comes from a survey of state and local pension plans conducted on an irregular basis from the late 1980s through the late 1990s. While this data provides rich information on plan governance, funding status, returns, and asset allocation across broad asset classes, it does not provide any information on the specific securities held by these state and local plans. A more recent study by Munnell, Haverstick, Soto and Aubry (2008) uses data from the Census of Governments to obtain an understanding of the broader universe of public plans, including more than 2,000 locally administered plans. While these data do allow the authors to analyze broad trends in overall equity allocation, the authors do not have detailed information on equity holdings.

Relative to the existing literature, a key advantage of our data is that we can examine the decision of a pension plan to hold a particular stock, and this fine level of detail enables us to differentiate among competing explanations for observed, more aggregated investment patterns (e.g., what explains a within-state investment bias). Detailed security-level analysis allows us to

control for differing riskiness across various potential stock investments and enables us to link characteristics of the firm and the location of the firm's headquarters to whether the state pension fund decides to invest in that firm.

*2.2 Local Investing*

A growing literature in finance documents that many different types of investors seem to tilt their portfolio holdings toward local investments and, further, make better stock picks or recommendations concerning firms that are geographically proximate. The interpretation of this finding is that investors located closer to a potential investment may have more information concerning the investment than more distant investors.

Coval and Moskowitz (1999) examine the holdings of U.S. mutual fund managers and find a local bias in their holdings. Coval and Moskowitz (2001) further find that mutual fund managers' local investments (defined as investments in firms located within 100 kilometers of the manager) outperform their non-local investments by 2.65% per year. However, since mutual fund managers may have some target index or benchmark, the extent to which they can tilt their portfolio toward local stocks appears to be limited – the bias in aggregated mutual fund holdings is only 13% (mutual fund managers invest 7% in local stocks, if they invested in the stock market the percent of local holdings would be 6.2%).

Baik, Kang, and Kim (2009) extend the work of Coval and Moskowitz by examining the portfolio decisions of all institutional money managers (that is, all institutions that file a Form 13F with the SEC disclosing their U.S. equity holdings). Besides mutual fund managers, this includes investment advisors, insurance companies, banks, and the small number of pension plans and endowments that manage their own money. They find these institutional investors tilt

their holdings to local stocks (their definition of a local investment is one that is within the same state as the fund manager, which makes their result on local bias directly comparable to our analysis), with the local bias being 24%. Institutional money managers as a whole invest 8.2% of their portfolio in within-state stocks (while their market share is 6.6%). Again, there appears to be some information in these local holdings, as the local holdings and trades of institutional investors, particularly investment advisors, earn excess returns.

Equity analysts and corporate acquirers also seem to exploit a local informational advantage. Malloy (2005) finds that geographically-proximate analysts issue more accurate forecasts and update their forecasts more frequently. Bae, Stulz, and Tan (2008) document local analysts' information advantage in a non-U.S. setting. Kang and Kim (2008) find that local acquirers of a "block" of corporate shares engage in more monitoring than do more distant acquirers, with the more local target earning a higher return on the announcement of the acquisition and having better post-acquisition operating performance.

Finally, individual investors exhibit a strong local bias both in their 401(k) plan through investments in employer stock (Benartzi, 2001) and through their direct stock holdings outside of their retirement plan (Ivkovich and Weisbenner, 2005). Indeed, the local bias among individual investors is substantially larger than that for institutions: the typical individual holds one-third of their stock portfolio in local stocks, whereas if they instead invested in the overall market, the fraction of local stocks would be just over one-tenth. Benartzi (2001) finds no information advantage, i.e., there is no difference in the future performance of stocks with low or high company stock allocations in the firm's 401(k) plan. However, Ivkovich and Weisbenner (2005) find that outside their retirement plan, individuals' local stock holdings outperform their non-

local stock holdings, but only for the subset of stocks not in the S&P 500. Fir the nationally-known S&P 500 stocks, the authors find that being "local" confers no informational advantage.

Thus, a local tilt in portfolio holdings, although slight in many cases, has been documented across many different types of market participants with many of them earning some "return to their locality." State pensions are of particular interest because, unlike other institutional investors, they have to take into account both background risk (how does the performance of holdings in the pension fund correlate with the state's tax revenue growth), as well as political considerations when making their investment decisions.

## 3. What U.S. Stocks Do State Pension Plans Hold?

### *3.1 Overview of Portfolio-Holdings Data*

In order to construct the equity portfolio holdings for the states that self-manage their portfolios, we obtain data on plan-level holdings of publicly traded stocks from the SEC form 13F filings. Institutional investment managers who manage over $100 million in domestic equities are required to file the 13F. Investment managers disclose their holdings on a quarterly basis.[4]

Most states have multiple public plans: a 2004 Wilshire Associates research report on the financial status of state pension plans in 2004 includes 123 state plans in the U.S. Most of these plans contract with outside firms for their investment management. Because these outside investment managers are required only to report their total holdings of each security, and specifically are not required to specify for which client they are holding the assets, it is not

[4] There is some confusion in the academic literature over the filing requirements for form 13-f. For example, Badrinath and Wahal (2002) report suggest that the filing of a 13-f is voluntary for public pension plans. Our discussions with the relevant SEC staff, however, suggest that state pensions with more than $100 million in 13-f assets are, in fact, required to file. Thus, the absence of many state pensions from the data is due to the use of investment managers under whose name the assets are reported, not due to the absence of a requirement to report.

possible to evaluate specific security holdings by state plans with these outside investment managers. We are able to identify 20 large state pension plans that filed 13-f forms at least once between the first quarter of 1980 and the third quarter of 2008. In table 1 we show the state plans that are included in our data, the first and last quarters that they appear in our sample (we collected holdings data through the third quarter of 2008), and the total number of quarters in which they appear in the sample.

We can compare the characteristics of these plans to the ones not in our sample using data from the 2004 Wilshire report on the financial status of state pension plans (2004 was the last Wilshire report that contained the plan-specific details necessary to conduct the tabulations we discuss below). As noted in Table 2, while the 13 plans that managed their own U.S. equity holdings, as reported in the 2004 Wilshire report, represent only 11 percent of the total number of state pension plans, they represent 46 percent of all the state plan assets. As these numbers suggest, it is primarily the very large plans that manage their own equity portfolio: the average size of the plans in our sample was $60.3 billion in 2004, compared with an average size of $8.5 billion for plans outside of our sample. These large plans tend to hold a slightly higher fraction (47%) of their overall portfolio in equities than do the smaller plans not in our sample (42%).

Using the 13F data, we are able to construct the equity portfolios of these plans. Our data spans 115 quarters (from the first quarter of 1980 to the third quarter of 2008), although not all plans manage their own portfolio over the entire sample period. Taking this into account, we have 1,592 plan-quarter observations on portfolio holdings by these states. In table 3, we report the state pension plans' equity allocation by size (S&P 500 versus smaller companies) and by 12

industry classifications.[5] We also compare the pension plan weights of their U.S. equity investments to the weights of these particular categories of stocks in the overall stock market.

In the first two columns of Table 3, we report this on a value-weighted basis – in other words, we simply add up the asset holdings across all 20 plans in our sample for each quarter, compute the shares for the overall state pension plan portfolio, and then take the average of these shares across the 115 quarters. These value-weighted state-pension plan holdings over the 115 quarters of the sample are then compared to the average quarterly stock-market weights. In the second two columns, we compute the portfolio weights for each plan for each quarter and then take the average of the state pension portfolio shares across all 1,592 of these plan-quarter observations (i.e., equal weighting). In this case, these equal-weighted state-pension plan holdings over the 1,592 plan-quarter observations in the sample are then compared to the quarterly stock-market weights corresponding to the appropriate quarter of the plan-quarter observations. In essence, the latter approach gives CALPERS and the Alaska PERS pension system equal weight, while the former approach gives CALPERS a much larger weight than Alaska PERS (because CALPERS has a much larger stock portfolio).

The results are quite similar across both methods. In essence, what we find is that these state plans are primarily (84%) invested in large (S&P 500) stocks, and indeed overweight these large company stocks relative to a value weighted index of the entire stock market (for which the S&P 500 comprises 72% of the value). When broken down by 12 major industries, we find that the states that manage their own pension plans tend to stay within about 1.5 percentage points of the market weights, with the largest overweighting coming in manufacturing and the largest underweighting coming in utilities.

[5] The industry classifications are from Ken French's website:
http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/Data_Library/det_12_ind_port.html

*3.2 Is There an In-State Bias?*

Table 4 provides the first evidence that states which manage their own equity portfolios exhibit a substantial in-state bias in their investment decisions. In row 1 through 6, we compare in-state and out-of-state investment holdings – further delineated by large (S&P 500) stocks versus smaller (non-S&P 500) stocks – to the holdings we would expect if these plans simply mirrored the market. On a value-weighted basis, the plans in our sample hold 9.7 percent of their portfolio in in-state stocks (column 1), versus a benchmark holding of only 5.6 percent in the market portfolio (column 2), a difference of 4.2 percentage point in their portfolio (column 3), representing a 76% overweighting (column 4). The Coval and Moskowitz (1998) study of mutual fund managers and the Baik, Kang, and Kim (2009) study of institutional managers in general, were also conducted on a value-weighted basis across funds/institutions (as in the left panel in Table 4), thus allowing direct comparison with our sample of state pension plans. Coval and Moskowitz found mutual fund managers overweight local holdings by 13% and Baik, Kang, and Kim found that institutions in general overweight their within-state holdings by 24% - one third of the within state bias exhibited by state pension plans that manage their own U.S. equity holdings.

On an equal-weighted basis, we see that the in-state bias still exists, although it is somewhat mitigated, suggesting that the in-state bias is strongest in the largest plans (right panel of Table 4). At first blush, this bias appears to be concentrated in larger stocks, whereas the in-state non-S&P 500 stocks are held in the same proportion as in the market portfolio. Once one considers that these plans underweight small company stocks overall, however, it becomes clear that the in-state bias extends to smaller stocks as well. For example, an out-of-state small

company stock comprises nearly 27% of the market portfolio, but only 14% of the average state's portfolio. Thus, conditional on the lower probability of a small stock being held at all, the additional probability of being held if in-state is quite substantial.

That states exhibit an in-state bias would seem to run counter to the initial intuition of most financial economists because it would appear to be increasing, rather than decreasing, the volatility of the state's overall fiscal "portfolio." Relative to other institutional money managers, a state pension fund manager should also account for the background risk of the state financial situation. For example, if the economy of Texas (and consequently the state's budget balance) is correlated with the performance of the oil industry, it would be unwise for state pension plans in Texas to invest heavily in oil stocks. Indeed, if the correlations are high enough, then on purely financial grounds the state may even wish to short the in-state stocks. Viewed through this lens, having the state pension plans invest in in-state stocks is akin to an individual investing their retirement assets in the stock of their own employer.

In the analysis that follows, we will explore three non-exclusive reasons for the within-state bias in state pension plans. The first is *familiarity* bias, or put simply, the tendency for people (and institutions) to invest in what they know (Huberman, 2001).[6] A key feature of familiarity bias is that it is not information-based so that investing in the familiar does not lead to excess returns. A second possible reason for the in-state bias is that the officials making the investment decisions have an *information advantage* with regard to local stocks. Such an informational advantage would not be particularly surprising given the literature documenting the "returns to local information" among mutual fund managers (Coval and Moskowitz, 2001),

[6] Other examples of familiarity bias include the home bias puzzle, i.e., the tendency of citizens of countries to over-invest in stocks from their own country (e.g., French and Poterba, 1991), as well as Bernartzi's (2001) finding that companies with high ownership of employer stock in their 401(k) plan do not outperform companies with lower concentrations of ownership in employer stock.

institutional money managers in general (Baik, Kang, and Kim, 2009) and even individual investors (Ivkovich and Weisbenner, 2005). The key distinction between the "familiarity" explanation and the "locality" explanation is that the latter implies excess returns while the former does not. A third possible explanation is that state pensions plans are operated in a political environment and thus there is some potential for in-state investing to be done for non-financial, politically-motivated reasons.

In distinguishing information based stories from familiarity bias, it is reasonable to suspect that states may know more about firms in those industry that dominate the state's economic base. For example, it is reasonable to think that investment managers in Texas may know more about the oil industry than investment managers in Illinois. The final 6 rows of table 4 conduct a further breakdown of the portfolio holdings on the basis of whether a firm is in the largest industry in the state (as measured by total firm market capitalization across the industries in the state). For example, when the state in question is California, the state's largest industry is business equipment/technology (i.e., computer/software), and thus any firm that is in the technology industry is coded as a 1 when the plan being analyzed is a California plan, and zero otherwise. Thus, Microsoft (headquartered in Washington state) would be coded as "Biggest industry = 1" for California PERS and California Teachers, but would be coded as "Biggest industry = 0" for all other states for which technology is not the largest industry. We continue to find a bias toward in-state stocks, but the bias is only modestly larger for the "biggest industry" stocks than the "non-primary industry" stocks.

Another perhaps more intuitive way to examine the extent of in-state bias is to simply compute the probability that a state pension plan holds a particular type of stock. The results of this type of calculation are displayed in Figures 1 and 2. The probability of a state pension

holding any stock is 17.8%. In figure 1, we see that this probability rises to 24.8% for stocks that are in-state (and falls to 17.4% for out-of-state stocks). Thus, being an in-state stock increases the probability of being held by the state's pension plan by 7.4 percentage points (this difference is shown as the first bar in Figure 2).

The prior literature on the returns to local information suggests that information advantages are most likely to exist for smaller, non-S&P 500, companies (Ivkovich and Weisbenner, 2005). The intuition is simply that it would be difficult to maintain an informational advantage on the largest firms which are national in scope, that tend to have dedicated analysts at leading investment firms, and that receive prominent coverage from the business press. To the extent that informational advantages exist for local firms, therefore, they are likely to be concentrated in smaller firms that receive less national attention.

Conditional on being an S&P 500 company (for which the probability of being held is much higher), there is 7.2 percentage point boost in the likelihood of being held by the state associated with being an in-state stock (79.3 vs. 72.2). There is a similar 7.5 percentage point boost for non-S&P 500 firms, although this percentage point boost is much more dramatic relative to the lower baseline probability of being held in the first place: just over a 50% increase in the probability of being held (from a probability of 12.3 to 19.8 percentage points).

The remaining data in Figure 1 further decomposes the probability of state ownership by the biggest industry in the state. This essentially takes the informational advantage hypothesis one step further, namely, that investment managers in Texas are more likely to have an informational advantage for oil companies – which is the dominant industry in Texas – than for, say, consumer products companies. Consistent with this, we find that the probability of being held in a state's pension portfolio is 31.1% for in-state stocks from the state's largest industry.

This is quite large relative to either the probability of being held as an in-state firm from another industry (22.9) or as an out-of-state firm in the same industry (16.6). As referenced earlier, Figure 2 display the *difference* in percentage points in the likelihood of holding a particular stock if the firm is headquartered within the same state as the pension plan relative to holding that same type of stock if the firm is headquartered out of the state. Figure 2 also makes clear that the within-state bias in the likelihood of a pension plan holding a particular type of stock is much larger for firms in the largest industry in the pension plan's home state than it is for firms in other industries.

## 4. Implications and Explanations of the In-State Bias

### *4.1 Do Pension Investment Choices Exacerbate or Mitigate State Fiscal Risks?*

These data clearly indicate that there exists an in-state bias. Before turning to a further examination of why states might do this, it is instructive to consider whether or not this in-state bias is likely to have welfare consequences aside from any differences in returns. The intuition from standard economic models would suggest that states would want to avoid investing in securities whose returns are positively correlated with the state's tax revenues; otherwise the state will see its pension assets decline in value at the same time that it is also experiencing negative shocks to state tax revenue.

Table 5 reports the correlations of the growth in state tax revenue with both the contemporaneous returns on the state pension plan and the lagged returns on the plan. There zero correlation with contemporaneous pension returns and the growth in state tax revenue, but a positive correlation emerges when we lag returns by one year. This likely reflects that the stock market is typically a leading indicator of changes in the economy, which are then reflected in

changes in tax revenue a year later. In a model that does not control for state or year fixed effects, we find a positive correlation of 0.20 between the growth in state tax revenue and the one-year-lagged state pension return, suggesting that states are investing in a manner that leads to a positive correlation between this year's pension returns and the subsequent year's growth in tax revenue. When one controls for state and year fixed effects, the correlation is even higher at 0.29.

*4.2 Familiarity versus Information: Do States Earn Excess Returns from their In-State Bias?*

Given that overweighting in-state stocks increases risk to taxpayers (as measured by the correlation between investment returns and the growth in tax revenues), it is important to know whether state investment managers are able to generate excess returns (consistent with an information-based story), or whether they in-state bias is welfare-reducing and driven purely by familiarity or non-financial factors. Thus, we now turn to an analysis of returns.

As a starting point, Table 6 simply reports the results of standard empirical asset-pricing models. There are two natural benchmarks that states might use in evaluating their equity market performance – the overall market portfolio (i.e., a value-weighted index of all stocks) or the S&P 500. In column 1 we report the basic CAPM model that regresses the excess returns (where "excess" means over and above the risk-free rate, that is, the return in excess of 1-month U.S. Treasuries) of the self-managed state pension plans against the excess returns of the value-weighted market portfolio. For perspective, if these plans simply mimicked market, the coefficient on "alpha" would be zero and the coefficient on the excess returns of the value weighted market return would be 1.0. In columns 2 and 3, we add in the additional risk factors

that are standard in the empirical asset pricing literature. In column 4, we simply replace the value-weighted market index returns with the returns on the S&P 500.

These results suggest that relative to the overall market portfolio, the self-managed state plans tend to overweight large stocks and underweight small stocks. Relative to the S&P 500 benchmark, they do the opposite (this reflects the S&P 500 index is comprised of the largest stocks in the U.S.). But we do not find strong evidence of any other "style" investing: while the coefficients on the value factor are statistically significant, they are quite small in magnitude.

The "alpha" coefficient is a standard measure in the empirical asset-pricing literature of the risk-adjusted excess returns on a portfolio. In other words, it is the "extra" return that a portfolio earns after adjusting for the standard, known risk factors. Portfolios with a significantly positive alpha are thought to have outperformed the market on a risk-adjusted basis. If state-pension-plan portfolio managers have some sort of information-advantage that drives their over-investment of in-state stocks, then one would expect to see significantly positive alphas. For the overall portfolio, we see no such evidence: the alphas in all the value weighted market portfolio specifications are all insignificantly different from zero, where as it is actually negative in the S&P 500 specification

Digging deeper in Table 7, however, we do begin to see some evidence consistent with some information-based portfolio decisions. In this table, we compare the alpha's (measured as monthly returns in percentage points) for in-state and out-of-state investment choices. A priori, we would expect, if the state pension plan managers are to have an informational advantage on any type of their plan holdings, it would most likely be the home-state stocks of firms that are within the state's largest industry (i.e., Texas pension plan managers likely know more about

oil/energy firms than do New York pension plan managers), and in particular, the smaller stocks with less of a "national" reputation (i.e., stocks not in the S&P 500).

Across all industries, the first row of Table 7, the alphas are insignificantly different across instate and out-of-state investments. Consistent with the hypothesis that it is difficult to have or maintain an information advantage for "national" stocks, there is no significant difference in the alphas for S&P 500 firms. While the difference on non-S&P 500 firms is somewhat larger than it is for S&P 500 firms (rising from 4 basis points to 16 basis point per month), it is also statistically insignificant (p-value = 0.12).

However, as we focus on the largest industry in a state, some evidence of information-based portfolio-choice surfaces. Specifically, we find that in the largest industry in a given state, the in-state portion of the portfolio significantly outperforms the out-of-state portion of the portfolio. While this is true for both S&P and non-S&P firms, the advantage is most pronounced in the smaller stocks. Specifically, we find that in-state, non-S&P 500 stocks from the state's largest industry outperform out-of-state small stocks from the same industry by 53 basis points per month, or an annual difference of 6.6 percentage points (roughly twice the differential found for S&P 500 stocks).

Of course, this differential is driven by two factors. First, these state plans seem to be able to generate positive excess returns on in-state, small companies from the state's largest industry. Second, they significantly *under*-perform in the out-of-state counterpart to these same investments. Thus, their "skill" at choosing good in-state firms is being partially offset by their "lack of skill" in choosing small, out-of-state stocks from the same industry. These states would be better off investing in the small, in-state stocks from their biggest industry and divesting from the out-of-state stocks in those same industries.

While the prior analysis was based on comparing in and out of state stocks held by the plans, it is also interesting to know whether these self-managed state plans are able to choose the better stocks and shun the worse stocks (Coval and Moskowitz, 2001, conduct such an analysis for mutual fund managers). We examine this issue in Table 8 by comparing the performance of the stocks that plans choose to invest in relative to those that they choose not to invest in.

The evidence in Table 8 is striking: for in-state stocks – and especially for smaller in-state stocks and/or in-state stocks from the largest state industry – state investment managers appear able to differentially choose between winners and losers (and indeed, they seem particularly good at avoiding the losers). Indeed, when comparing small (non-S&P 500) stocks in the state's largest industry, we find that the firms in which the state plan invests have a risk-adjusted excess return of 32 basis points per month while those firms that are avoided by the state have a negative excess return of 28 basis points per month, for a difference of 60 basis points per month. This translates into a 7.8% annual return difference between the returns of small in-state stocks from the largest industry that the state invests in relative to those they shun. Figure 3 summarizes this data in another form by reporting the annualized difference in the performance of stocks selected versus avoided. Put simply, CALPERS knows which small technology stocks to buy and which to avoid, while Texas Teachers knows which small oil companies to buy and which to shun. Also consistent with an information-based explanation, we do not find any evidence of an information advantage when comparing the returns of "chosen" versus "avoided" *out-of-state* stocks. This is shown strikingly in Figure 3, as the differential in the performance across stocks held relative to those not held is concentrated among the firms located within the state of the pension plan – where the stocks the plan picks perform significantly better than those

they avoid – with essentially zero differential in the performance of the firms picked and those avoided that are located outside of the state of the pension plan.

*4.3 Political Considerations*

Despite some efforts to isolate pension funds from political interference, state pension fund management is potentially subject to political considerations. This could be quite explicit – such as outright corruption (e.g., sharing of inside information, states investing in companies in return for political support, etc.) – or it could be much more subtle – such as investment managers simply having more exposure to the leadership of well-connected companies.

Finding systematic evidence of outright corruption is often difficult because empirical work is limited by the fact that those who engage in corrupt behavior have an obvious incentive to hide their actions from the public, and thus from researchers. Until quite recently, researchers circumvented this problem primarily by using variation in the amount of corruption perceived by the public.[7] At least one recent study, however, has shown that using corruption perceptions, rather than more objective measures of corruption, can lead to incorrect conclusions, even if the perceptions appear correct on average (Olken, 2009).

Recently, a small but growing number of papers have begun to shift the focus to more objective measures of corruption, particularly in developing countries. For example, Olken (2007) documents missing expenditures in Indonesian road projects by comparing independent engineering estimates of prices and quantities to official village expenditure reports.[8] In a very different context, Duggan and Levitt (2002) provide evidence of corruption in sumo wrestling through a statistical analysis of win-loss percentages in high-stakes matches.

[7] Rose-Ackerman (2005) provides a review of this literature.
[8] Other studies of corruption in the development literature include Olken and Barron (2007), Fisman & Wei (2004), Reinikka & Svennson (2004), and Tran (2008).

Corruption, however, is not limited to developing countries or professional sports. Indeed, as pointed out by Glaeser and Saks (2006), between 1990 and 2002, federal prosecutors in the U.S. "convicted more than 10,000 government officials of acts of official corruption, such as conflict of interest, fraud, campaign-finance violations and obstruction of justice." Because political corruption is difficult to document, and even more difficult to prove in court, these federal convictions surely represent a lower bound on the amount of actual corruption taking place within the U.S. Unfortunately, as noted by Duggan and Levitt (2002), despite the widespread anecdotal evidence of widespread corruption in the U.S., there is little rigorous empirical research on the subject. Even fewer studies are able to document the effect of corruption on economic outcomes in the U.S. context.

One very interesting line of research that has produced such evidence has relied on event studies to determine how political connections affect firm value. In the U.S. context, Roberts (1990) provided evidence that politicians with seniority can provide benefits to specific firms by documenting a differential stock-price reaction to the news of the death of Senator Henry "Scoop" Jackson, the powerful chairman of the Senate Armed Services Committee. Jayachandran (2006) uses soft-money donations to national parties as a measure of a firm's political alignment, and finds that that for every $250,000 a firm gave to Republicans, the firm lost 0.8% of its market valuation when Senator Jeffords switched parties in 2001. Knight (2006) examines the Bush v. Gore election of 2000 and finds a significant 9 percent return differential between "Bush-favored": and "Gore-favored" firms. In a non-U.S. context, Fisman (2001) estimated the value of political connections by examining share price reactions to the end of Suharto's reign.

In the context of state pensions, we are interested in whether public pension plan investment decisions are influenced by political considerations. To examine this, we collect several sources of additional data. Because governors are often in a position to select or influence the members of the governing boards of state pension plans, we use information provided by Polidata on the historical vote counts in gubernatorial elections over our 1980-2008 sample period. We also collect data on campaign finance contributions for state gubernatorial elections from the Institute on Money in State Politics, a not-for-profit organization that maintains a database of contributions to state political campaigns, including the name, address, and occupation of the donor, the amount of the donation, and characteristics of the recipient campaign. To obtain an independent measure of a state's propensity to engage in corrupt activities, we follow Glaeser and Saks (2006) in using data derived from the Justice Department's "Report to Congress on the Activities and Operations of the Public Integrity Section," a report that includes the number of federal, state and local public officials convicted of a corruption-related crime by state. From Glaeser and Saks, we use the average from years 1990 to 2002 of the number of such convictions divided by the population of the state as determined in the 1990 and 2000 Censuses to come up with a state conviction rate per capita. Over the 13-year data period, there are, on average, 4 public officials convicted of corruption for every 100,000 state residents, and there is substantial variation across states.

We test whether the likelihood a pension plan holds a within-state stock is related to the political corruption of the state (as measured by the Glaeser-Saks (2006) index) as well as campaign contributions that flowed to the governor's campaign during the prior election cycle. We do not know total campaign contributions made by employees of individual firms, but we can identify campaign contributions going to the winning gubernatorial candidate at the county

level. We link to each firm located in the state of the pension plan (i.e., each potential within-state investment for the pension plan) the fraction of state-wide contributions to the governor that came from the county where that particular firm is headquartered.

Table 9 presents the OLS regression results of the likelihood that a state pension plan holds within-state stocks for various samples based on the corruption definition (high-corruptions vs. low-corruption, medium-corruption vs. low-corruption, and high-and-medium corruption vs. low corruption) and types of within-state stock holdings (all firms, S&P 500 firms, and non-S&P 500 firms).[9] Generally, we see that being from a more corrupt state leads to a higher likelihood of holding within-state stocks (on the order of 10-25 percentage points), and that there is a greater likelihood of investing in the firm if it comes from a county that accounted for a large share of the governor's campaign contributions in the past election cycle (and increase in the contribution share from 0.0 to 0.1 is associated with a 3.4 percentage point increase in the likelihood of the pension plan holding the stock).[10] The latter effect of campaign contributions on stock holdings in the pension plan is mitigated for plans in the more corrupt states.

Finally, we consider if the difference in the performance of within-state investments relative to out-of-state investments by the state pension plans varies by the corruption-level of the state. We find, displayed in Figure 4, that the instate-outstate differential in returns is significantly greater in the state pension plans located in states with medium-to-high-corruption relative to the states with low corruption—particularly when we focus on investments made in

[9] We classify states as being either "high corruption," (ranked 1-17 in the state-corruption index constricted by Glaser and Saks, 2006), "medium corruption," (ranked 18-33 in the state-corruption index), and "low corruption" (ranked 34-50 in the corruption index).

[10] We also estimated regressions that included a dummy variable indicating whether the county where the firm is headquartered voted for the governor in the prior election and an interaction of this "vote-for-winner" dummy variable with the "corrupt state" variable. Coefficients on both the "vote-for-winner" and its interaction with state corruptions were very small in magnitude and statistically insignificant.

the stocks in the largest industry of the home state.[11] The results regarding the interplay of state-level corruption with both the likelihood a stock is held and the in-state vs. out-state differential in performance are interesting topics to explore more fully in future research.

## 5. Conclusions

State pension plans have a choice as to whether to manage their investments "in house" or to instead hire an external manager. We find, among the state pension plans that manage their own U.S. equity investments, that they tend to tilt their state portfolios to stock holdings within the state—this within state bias in much larger than that observed by other institutional investors. Some of this within-state bias seems to reflect good information, as the holdings of these pension plans, particularly their holdings in small companies in the state's primary industry, outperform the stocks they choose not to hold by a wide margin—but this differential is only found for investments made (or avoided) within the state, the domain in which the pension plan is more likely to have access to information about firm prospects. The level of state corruption is associated with both a higher likelihood of holding within-state stocks and a higher return on the investments made in firms headquartered within the state relative to those made in firms located outside the state.

[11] Across each category of stocks (all stocks, stocks in the largest home-state industry, and stocks in the non-largest home-state industries), the instate-outstate differential return is statistically the same across the high-corruption and medium-corruption states, so those two categories are combined. The instate-outstate differential is statistically different across the Medium/High-Corruption and Low-Corruption states at the 5-percent level for the "All Stocks" sample, the difference is statistically significant at the 1-percent level for the "Stocks in Largest Home-State Industry" sample, and the difference is statistically insignificant for the "Stocks in Non-Largest Home-State Industries" sample.

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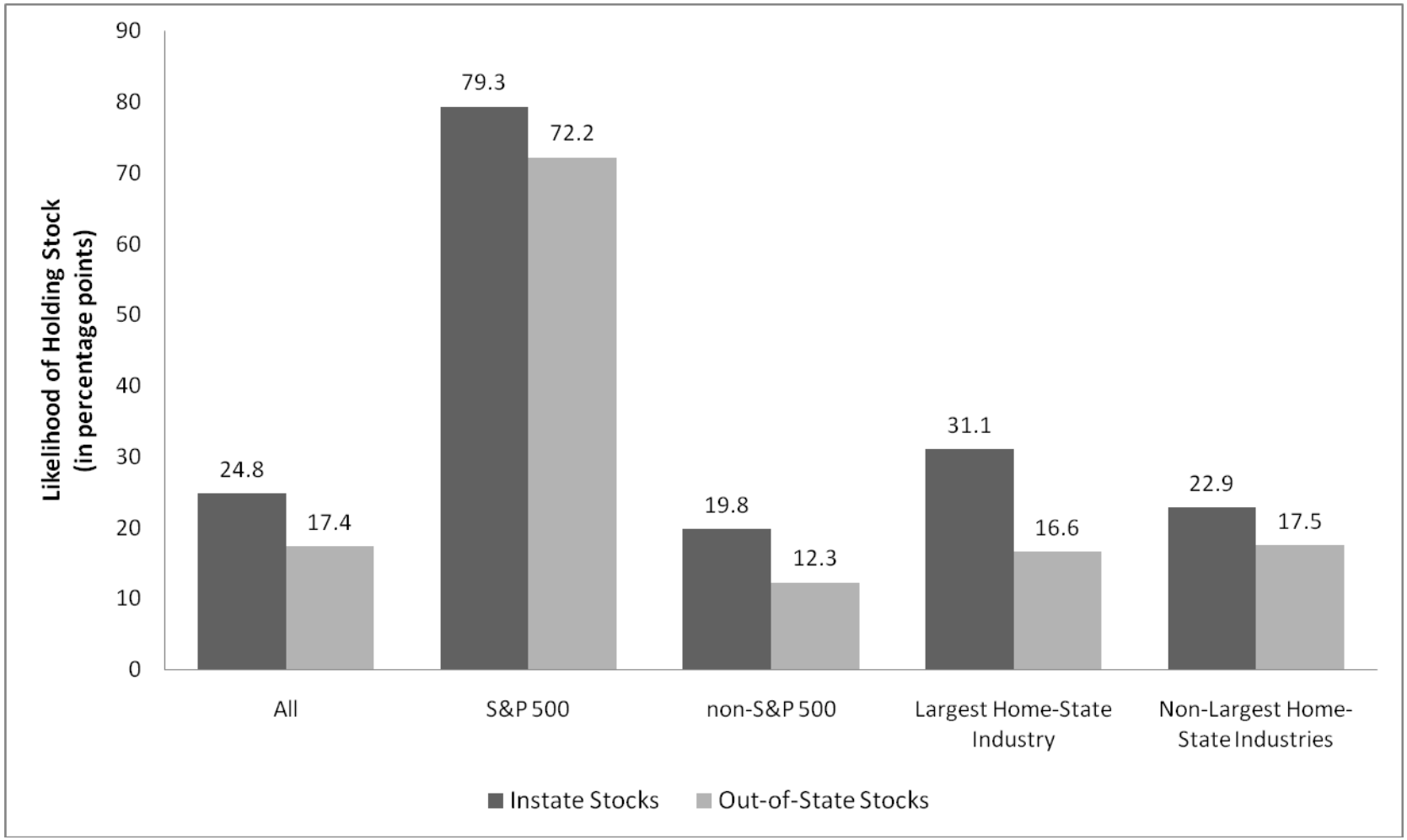
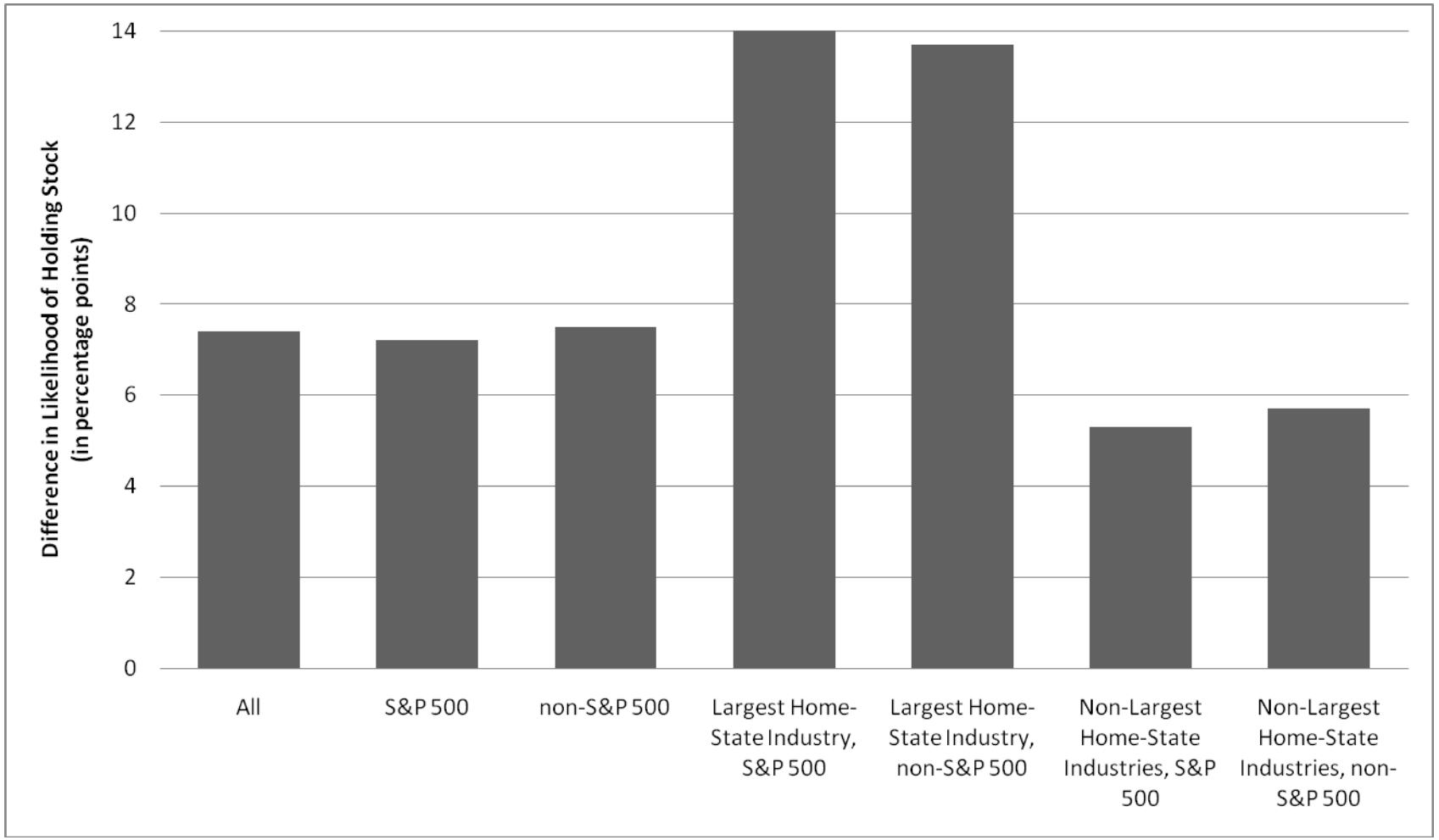
**Figure 1: Likelihood of a State Pension Plan Holding a Particular Stock, by Type of Stock (in percentage points), 1980-2008**



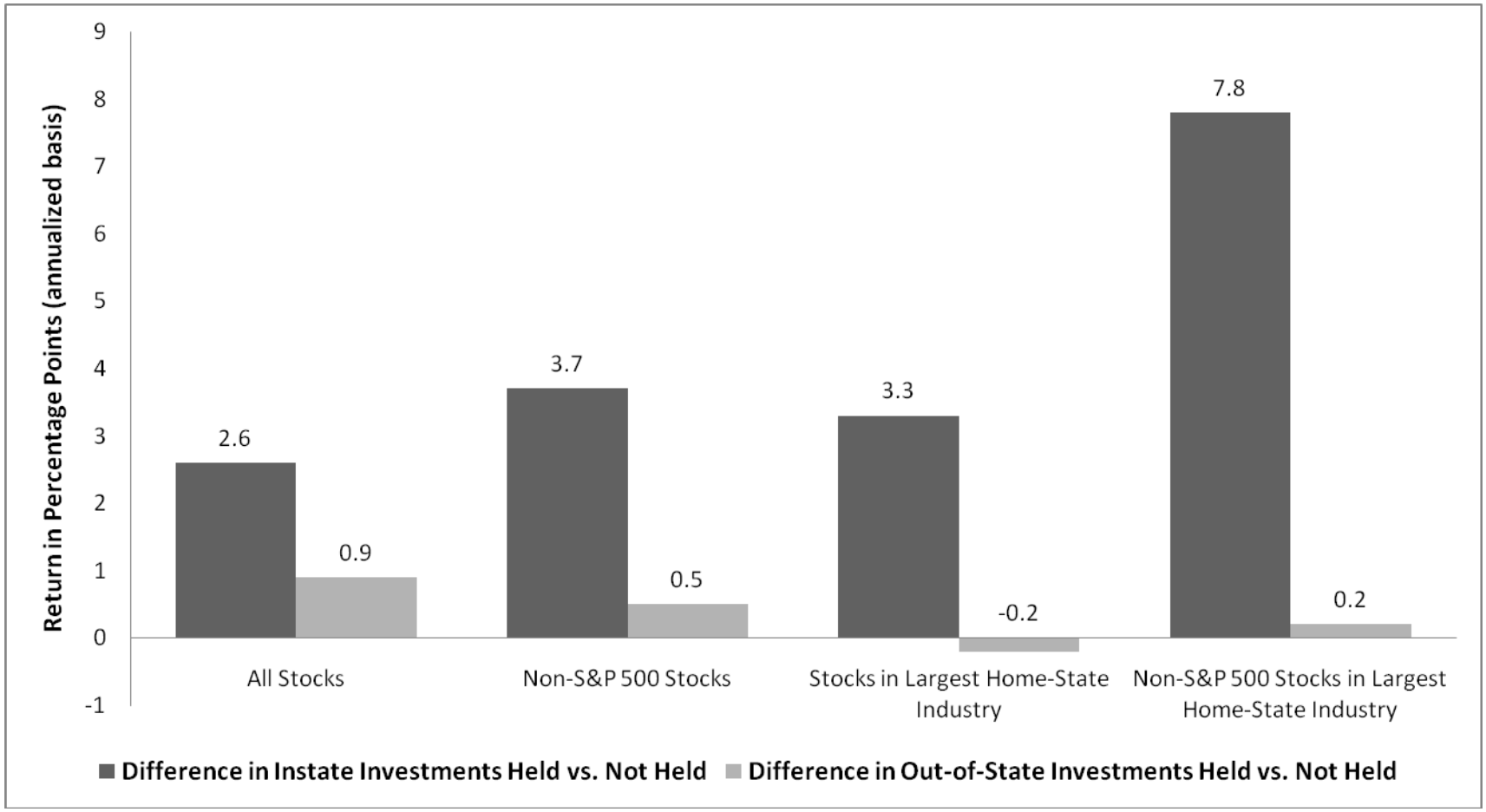

Sources: 13-F filings with SEC, Compustat and CRSP databases, and authors' calculations.

**Figure 2: Difference in Likelihood of a State Pension Plan Holding an Instate vs. an Out-of-State Stock, by Type of Stock (in percentage points), 1980-2008**



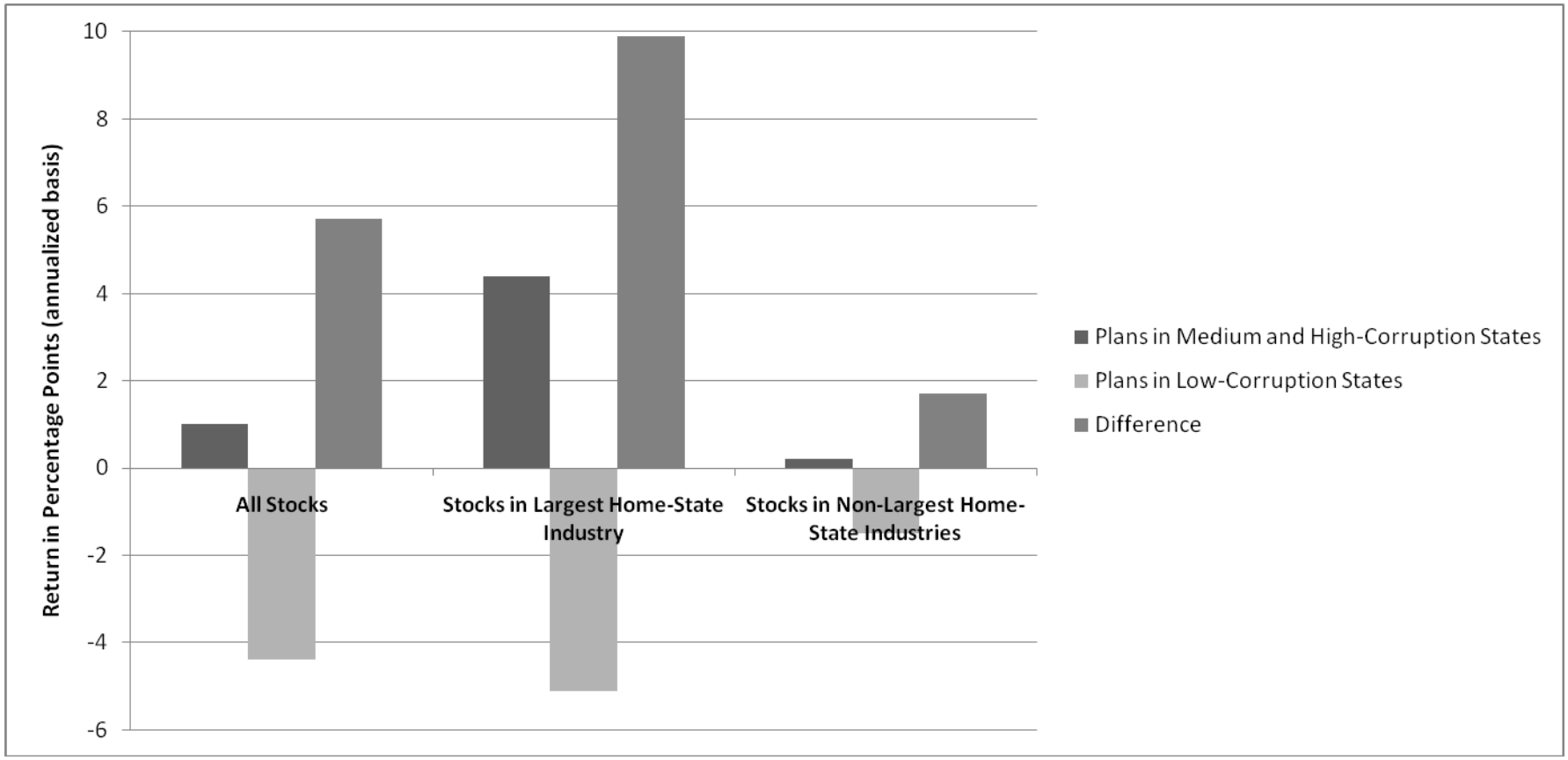

Sources: 13-F filings with SEC, Compustat and CRSP databases, and authors' calculations. All of the differences in the likelihood of holding instate vs. out-of-state stocks are statistically significant at the 5-percent level with the exception of the "Non-Largest Home-State Industries, S&P 500" sample.

**Figure 3: Annualized Differences in Performance (risk adjusted) of Stocks Held by State Pension Plans Relative to Stocks Not Held by State Pension Plans, 1980-2008**




The annualized difference in returns on the stocks held by pension plans and those not held by pension plans are based on the monthly differences displayed in columns (3) and (9) of Table 8. The differences in returns are risk-adjusted, that is, they were obtained from a four-factor return model that controls for market, firm size, firm value/growth, and momentum factors. All of the differentials across instate stocks held and not held are statistically significant while none of the differentials across out-of-state stocks held and not held are statistically significant (see columns (3) and (9) of Table 8).

**Figure 4: Annualized Differences in Performance (risk adjusted) of State Pension Plans Across INSTATE and OUT-OF-STATE Investments, by Type of Stocks Held and Level of State Corruption, 1980-2008**




The annualized difference in returns on the instate stocks held by pension plans and the out-of-state stocks held by pension plans are risk-adjusted, that is, they were obtained from a four-factor return model that controls for market, firm size, firm value/growth, and momentum factors. The level of state corruption is based on the state corruption index in Glaeser and Saks (2006). High corruption states are states that rank 1-17 in the corruption index, medium corruption states are those that rank 18-33, and high corruption states are those that rank 34-50. Across each category of stocks (all stocks, stocks in the largest home-state industry, and stocks in the non-largest home-state industries), the instate-outstate differential return is statistically the same across the high-corruption and medium-corruption states, so those two categories are combined. The instate-outstate differential is statistically different across the Medium/High-Corruption and Low-Corruption states at the 5-percent level for the "All Stocks" sample, the difference is statistically significant at the 1-percent level for the "Stocks in Largest Home-State Industry" sample, and the difference is statistically insignificant for the "Stocks in Non-Largest Home-State Industries" sample.

**Table 1: List of State Pension Plans in Sample**

| State Pension Plan Name | First Quarter U.S. Equity Holdings Are Reported in 13-F filing with SEC | Last Quarter U.S. Equity Holdings Are Reported in 13-F filing with SEC* | Total Number of Quarters in Sample |
|---|---|---|---|
| Alaska PERS | 2006:Q2 | 2008:Q3 | 10 |
| California PERS | 1980:Q2 | 2008:Q3 | 111 |
| California Teachers | 1980:Q1 | 2007:Q2 | 105 |
| Colorado Public Employees | 1980:Q1 | 2008:Q3 | 115 |
| Florida RS | 1986:Q2 | 2008:Q3 | 90 |
| Illinois SURS | 1980:Q2 | 1985:Q1 | 20 |
| Kentucky Teachers | 1982:Q4 | 2008:Q3 | 104 |
| Maryland State Retirement | 1980:Q1 | 1992:Q4 | 52 |
| Michigan Dept. of Treasury | 1984:Q3 | 2008:Q3 | 97 |
| Missouri State Employees | 1998:Q3 | 2007:Q4 | 38 |
| Montana State Board of Investment | 1991:Q3 | 2001:Q4 | 42 |
| New Mexico Education Retirement Board | 1990:Q1 | 2008:Q3 | 75 |
| New York Common Retirement Fund | 1986:Q4 | 2008:Q3 | 88 |
| New York Teachers | 1980:Q1 | 2008:Q3 | 108 |
| Ohio PERS | 1980:Q1 | 2008:Q3 | 110 |
| Ohio STRS | 1980:Q1 | 2008:Q3 | 115 |
| Pennsylvania Teachers | 2000:Q2 | 2008:Q3 | 34 |
| Texas Teachers | 1980:Q1 | 2008:Q3 | 115 |
| Virginia RS | 1996:Q4 | 2008:Q3 | 48 |
| Wisconsin RS | 1980:Q1 | 2008:Q3 | 115 |

*The last quarter of data we collected was holdings at the end of the third quarter of 2008.
Source: 13-F filings with SEC.

**Table 2: Number, Size, and Investment Allocation of State Pension Plans by Whether Directly Manage U.S. Equity Investments, 2004**

| | Plans that Manage U.S. Equity Investments Directly on Own | Plans that Outsource Management of U.S. Equity Investments |
|---|---|---|
| Number of Plans | 13 | 110 |
| Number as Percent of All State Pension Plans | 11% | 89% |
| | | |
| Average Plan Size (assets, in $M) | 60,265 | 8,518 |
| Median Plan Size (assets, in $M) | 51,741 | 5,457 |
| Percent of Aggregate State Pension Plan Assets | 46% | 54% |
| | | |
| Average Percent of Plan Invested in U.S. Equities | 47% | 42% |
| Median Percent of Plan Invested in U.S. Equities | 45% | 43% |
| | | |
| Average Ratio of U.S. Equities Reported on 13-F filing to Total U.S. Equity Holdings (i.e., percent of U.S. equity holdings that are directly managed) | 95% | 0% |

Sources: 2004 Wilshire Report on State Retirement Systems and 13-F filings with the SEC.

**Table 3: State Pension Plan Holdings by S&P 500 Status and Industry Classification (allocation as a share of total stock holdings, in percentage points), 1980:Q1-2008:Q3**

| | *State Plans weighted by Size ($) within a quarter* | | *State Plans are equally weighted* | |
|---|---|---|---|---|
| | Average weight in pension plan holdings | Average weight if invested in the market | Average weight in pension plan holdings | Average weight if invested in the market |
| S&P 500 Status | | | | |
| Member of S&P 500 | 84.4 | 71.6 | 84.3 | 72.0 |
| Not in S&P 500 | 15.6 | 28.4 | 15.7 | 28.0 |
| Industry Classification | | | | |
| Consumer Nondurables | 7.7 | 7.7 | 7.3 | 7.6 |
| Consumer Durables | 5.7 | 4.7 | 5.5 | 4.6 |
| Manufacturing | 11.0 | 9.5 | 10.3 | 9.2 |
| Energy | 8.2 | 8.1 | 7.7 | 7.6 |
| Chemicals and Allied Products | 4.8 | 4.4 | 4.7 | 4.3 |
| Business Equipment (computers) | 14.1 | 13.4 | 14.3 | 13.9 |
| Telecom | 4.5 | 5.3 | 4.3 | 5.4 |
| Utilities | 4.5 | 5.6 | 4.2 | 5.3 |
| Wholesale/Retail | 8.0 | 7.9 | 8.0 | 8.0 |
| Health | 9.0 | 8.6 | 9.3 | 9.0 |
| Finance | 17.5 | 18.7 | 19.5 | 19.2 |
| Other | 5.1 | 6.0 | 4.9 | 6.0 |

Source: 13-F filings with SEC, Compustat and CRSP databases, and authors' calculations. Industry classifications based Ken French's classification: http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/Data_Library/det_12_ind_port.html.

**Table 4: Breakdown of State Pension Plan Stock Holdings by Instate and Out-of-State Investments (allocation expressed as a share of total stock holdings, in percentage points), 1980:Q1-2008:Q3**

| | *State Plans weighted by Size ($) within a quarter* | | | | *State Plans are equally weighted* | | | |
|---|---|---|---|---|---|---|---|---|
| | Average weight in pension plan holdings | Average weight if invested in the market | Different in weights (bias) | *Amount of bias relative to the market in percent* | Average weight in pension plan holdings | Average weight if invested in the market | Different in weights (bias) | *Amount of bias relative to the market in percent* |
| | (1) | (2) | (3) = (1) –(2) | *(4) = (1)/(2) - 1* | (5) | (6) | (7) = (5) – (6) | *(4) = (5)/(6) - 1* |
| Instate Investments | 9.7 | 5.6 | 4.2 | *76%* | 6.4 | 5.5 | -0.9 | *16%* |
| Instate & Member of S&P 500 | 8.2 | 4.0 | 4.2 | *105%* | 5.2 | 4.0 | 1.2 | *31%* |
| Instate & Not in S&P 500 | 1.5 | 1.5 | 0.0 | *0%* | 1.2 | 1.5 | -0.3 | *-22%* |
| | | | | | | | | |
| Out-of-State Investments | 90.3 | 94.4 | -4.2 | *-4%* | 93.6 | 94.5 | -0.9 | *-1%* |
| Out-of-State & Member of S&P 500 | 76.2 | 67.6 | 8.6 | *13%* | 79.0 | 68.0 | 11.0 | *16%* |
| Out-of-State & Not in S&P 500 | 14.0 | 26.8 | -12.8 | *-48%* | 14.6 | 26.5 | -11.9 | *-45%* |
| | | | | | | | | |
| Investment in Neighbor States | 8.3 | 8.5 | -0.2 | *-2%* | 8.5 | 8.5 | 0.0 | *0%* |
| Investment in Non-Neighbor States | 81.9 | 85.9 | -4.0 | *-5%* | 85.0 | 85.9 | -0.9 | *-1%* |
| | | | | | | | | |
| Primary/Largest Home-State Industry | 13.1 | 11.3 | 1.8 | *16%* | 11.4 | 11.2 | 0.2 | *2%* |
| Instate Investment in Largest Home-State Industry | 3.7 | 2.0 | 1.8 | *89%* | 2.5 | 2.0 | 0.5 | *23%* |
| Out-of-State Investment in Largest Home-State Industry | 9.3 | 9.3 | 0.0 | *0%* | 8.9 | 9.2 | -0.3 | *-3%* |
| | | | | | | | | |
| Non-Primary Home-State Industry | 86.9 | 88.7 | -1.8 | *-2%* | 88.6 | 88.8 | -0.2 | *0%* |
| Instate Investment in non-Largest Home-State Industry | 6.0 | 3.6 | 2.4 | *68%* | 3.9 | 3.5 | 0.5 | *13%* |
| Out-of-State Investment in non-Largest Home-State Industry | 80.9 | 85.1 | -4.2 | *-5%* | 84.7 | 85.3 | -0.6 | *-1%* |

Sources: 13-F filings with SEC, Compustat and CRSP databases, and authors' calculations. The largest home-state industry is the largest industry based on total firm market capitalization where firms are assigned to one of the 12 industries listed in Table 3.

**Table 5: Correlation of Annual Growth Rate in State Tax Revenue with Contemporaneous and Lagged Annual State Pension Plan Returns, 1980-2008**

| | *Correlation of Annual Growth Rate in State Tax Revenue with:* | | | |
|---|---|---|---|---|
| Contemporaneous Annual State Pension Return on U.S. Equity Investments | -0.002<br>(0.072) | 0.006<br>(0.098) | | |
| One-year Lagged State Pension Plan Return on U.S. Equity Investments | | | 0.20**<br>(0.09) | 0.29**<br>(0.13) |
| Include year fixed effects and state fixed effects? | No | Yes | No | Yes |
| Number of Pension-Year Observations | 375 | 375 | 350 | 350 |

***, **, * denote statistical significance at the 1 percent, 5 percent, and 10 percent levels, respectively.
Annual state tax revenue is obtained from the U.S. Census Bureau (http://www.census.gov/govs/www/qtax.html). The standard error of the correlation estimate is in parentheses. State pension plan returns on their U.S. equity investments is based on authors' calculations using 13-F filings with the SEC and the Compustat and CRSP databases.

**Table 6: Performance of State Pension Plans (aggregated across plans, expressed as monthly returns in percentage points), 1980-2008**

| | *Regressions of Monthly Returns of Aggregated State Pension Plans (in percentage points)* | | | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| Constant<br>(Alpha = risk-adjusted excess return) | 0.01<br>(0.03) | -0.01<br>(0.03) | 0.01<br>(0.03) | -0.05**<br>(0.02) |
| Market Factor Return: Value-weighted Market (VWRF) | 0.98***<br>(0.01) | 1.01***<br>(0.01) | 1.00***<br>(0.01) | |
| Market Factor Return: S&P 500 Market (SP500RF) | | | | 1.01***<br>(0.01) |
| Size Factor Return<br>(SMB) | | -0.10***<br>(0.01) | -0.10***<br>(0.01) | 0.12***<br>(0.01) |
| Value Factor Return<br>(HML) | | 0.05***<br>(0.01) | 0.04***<br>(0.01) | 0.02**<br>(0.01) |
| Momentum Factor Return<br>(UMD) | | | -0.02***<br>(0.01) | -0.00<br>(0.01) |
| Adjusted R-squared | 0.98 | 0.99 | 0.99 | 0.99 |
| Number of Observations (months) | 345 | 345 | 345 | 345 |

***, **, * denote statistical significance at the 1 percent, 5 percent, and 10 percent levels, respectively.

Columns 1 through 4 report the OLS regression coefficients of monthly excess returns for the US equity component of pension plan investments on different sets of monthly benchmark return factors from 1980 until 2008. VWRF is the return on the CRSP value-weighted stock index minus the 1-month treasury rate (while SP500RF is the return on the S&P 500 stock index minus the 1-month treasury rate). SMB and HML are the returns on the Fama-French factor-mimicking portfolios for size and book-to-market, respectively. Specifically, SMB is the difference in returns of small stocks relative to large stocks while HML is the difference in returns of value/income stocks relative to growth stocks. UMD is the return on the factor-mimicking portfolio for momentum (i.e., the difference in returns of stocks that have risen over the past 11 months relative to those stocks that have fallen). These factor returns are obtained from the Ken French website (http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/Data_Library/f-f_factors.html). The dependent variable is the return of the aggregated pension fund holdings across all the plans less the 1-month treasury rate. The constant of the regression is interpreted as the risk-adjusted return of the aggregated state pension plan (i.e., state pension plans' "Alpha"). It is measured in percentage points and is estimated on a monthly basis. Standard errors are in parentheses.

**Table 7: Performance of Various Components of State Pension Plans' Equity Investments (aggregated across pension plans, expressed as monthly returns in percentage points), 1980-2008**

| | Risk-adjusted Excess Monthly Portfolio Return (in percentage points) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | *All Stocks* | | | *S&P 500 Stocks* | | | *Non-S&P 500 Stocks* | | |
| | Instate | Out-of-State | **Difference** | Instate | Out-of-State | **Difference** | Instate | Out-of-State | **Difference** |
| | (1) | (2) | **(3)** | (4) | (5) | **(6)** | (7) | (8) | **(9)** |
| Stock holdings in all industries | 0.07<br>(0.06) | 0.01<br>(0.03) | **0.06**<br>**(0.07)** | 0.07<br>(0.07) | 0.03<br>(0.05) | **0.04**<br>**(0.07)** | 0.08<br>(0.13) | -0.09<br>(0.07) | **0.16**<br>**(0.10)** |
| Stock holdings in the largest home-state industry | 0.10<br>(0.15) | -0.18**<br>(0.08) | **0.28***<br>**(0.15)** | 0.09<br>(0.16) | -0.17**<br>(0.09) | **0.26***<br>**(0.15)** | 0.32<br>(0.25) | -0.21<br>(0.14) | **0.53****<br>**(0.27)** |

***, **, * denote statistical significance at the 1 percent, 5 percent, and 10 percent levels, respectively.
The displayed returns are risk-adjusted, that is, they were obtained from a four-factor return model that controls for market-wide, firm size, firm value/growth, and momentum factors as in column (3) of Table 6. The largest home-state industry is the largest industry based on total firm market capitalization where firms are assigned to one of the 12 industries listed in Table 3.
Standard errors are in parentheses.

**Table 8: Performance of Stocks that State Pension Plans HELD Relative to Stocks NOT HELD (aggregated across pension plans, expressed as monthly returns in percentage points), 1980-2008**

| | Risk-adjusted Excess Monthly Portfolio Return (in percentage points) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | *All Stocks* | | | *S&P 500 Stocks* | | | *Non-S&P 500 Stocks* | | |
| | Held | Not Held | **Difference** | Held | Not Held | **Difference** | Held | Not Held | **Difference** |
| All instate stocks | 0.07<br>(0.06) | -0.14$^{*}$<br>(0.08) | **0.21$^{**}$<br>(0.09)** | 0.07<br>(0.07) | 0.22<br>(0.18) | **-0.15<br>(0.20)** | 0.08<br>(0.13) | -0.23$^{***}$<br>(0.07) | **0.30$^{**}$<br>(0.12)** |
| Instate stocks in the largest home-state industry | 0.10<br>(0.15) | -0.17<br>(0.16) | **0.27$^{*}$<br>(0.17)** | -0.01<br>(0.15) | -0.24<br>(0.29) | **0.23<br>(0.32)** | 0.32<br>(0.25) | -0.28$^{*}$<br>(0.16) | **0.60$^{**}$<br>(0.24)** |
| All out-of-state stocks | 0.01<br>(0.03) | -0.07<br>(0.05) | **0.07<br>(0.06)** | 0.03<br>(0.04) | 0.10<br>(0.07) | **-0.07<br>(0.07)** | -0.09<br>(0.07) | -0.13$^{**}$<br>(0.05) | **0.04<br>(0.07)** |
| Out-of-state stocks in the largest home-state industry | -0.18$^{**}$<br>(0.08) | -0.17$^{*}$<br>(0.10) | **-0.01<br>(0.10)** | -0.17$^{**}$<br>(0.09) | 0.04<br>(0.14) | **-0.21<br>(0.16)** | -0.21<br>(0.14) | -0.23$^{**}$<br>(0.11) | **0.02<br>(0.14)** |

$^{***}$, $^{**}$, $^{*}$ denote statistical significance at the 1 percent, 5 percent, and 10 percent levels, respectively.
The displayed returns are risk-adjusted, that is, they were obtained from a four-factor return model that controls for market-wide, firm size, firm value/growth, and momentum factors as in column (3) of Table 6. The largest home-state industry is the largest industry based on total firm market capitalization where firms are assigned to one of the 12 industries listed in Table 3.
Standard errors are in parentheses.

**Table 9: Likelihood a State Pension Plan Holds an INSTATE Stock in its Portfolio, by S&P-500 Status, Based on State Corruption and Share of Governor's Campaign Contributions from the County of Firm Headquarters, 1980-2008**

| | Plans from High-Corruption States vs. Plans from Low-Corruption States | | | Plans from Medium-Corruption States vs. Plans from Low-Corruption States | | | Plans from High- & Medium-Corruption States vs. Plans from Low-Corruption States | | |
|---|---|---|---|---|---|---|---|---|---|
| | *All* | *S&P 500* | *Non-S&P 500* | *All* | *S&P 500* | *Non-S&P 500* | *All* | *S&P 500* | *Non-S&P 500* |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
| From "corrupt" state? | 0.10* | 0.12 | 0.12** | 0.25*** | 0.12 | 0.27*** | 0.19*** | 0.12 | 0.21*** |
| | (0.05) | (0.18) | (0.06) | (0.08) | (0.18) | (0.09) | (0.06) | (0.17) | (0.07) |
| Share of governor's campaign contributions from firm's county | 0.34** | -0.02 | 0.35*** | 0.34** | -0.02 | 0.35*** | 0.34** | -0.02 | 0.35*** |
| | (0.15) | (0.49) | (0.08) | (0.15) | (0.50) | (0.08) | (0.15) | (0.48) | (0.08) |
| Corrupt * Governor contribution share | -0.09 | -0.04 | -0.30** | -0.65*** | -0.08 | -0.66*** | -0.39* | -0.04 | -0.51*** |
| | (0.18) | (0.49) | (0.13) | (0.20) | (0.51) | (0.16) | (0.21) | (0.48) | (0.14) |
| Constant | 0.22*** | 0.86*** | 0.16*** | 0.22*** | 0.86*** | 0.16*** | 0.22*** | 0.86*** | 0.16*** |
| | (0.01) | (0.18) | (0.02) | (0.01) | (0.18) | (0.03) | (0.01) | (0.17) | (0.02) |
| Adjusted R-squared | 0.01 | 0.04 | 0.01 | 0.02 | 0.04 | 0.02 | 0.01 | 0.03 | 0.01 |
| Number of Plan Quarter-Stock Holding Decisions | 73,471 | 8,479 | 64,992 | 96,110 | 7,444 | 88,666 | 158,777 | 14,854 | 143,923 |

***, **, * denote statistical significance at the 1 percent, 5 percent, and 10 percent levels, respectively.
Regressions estimated are linear-probability models (OLS) where the dependent variable equals one if the instate stock is held in the pension plan's portfolio and zero if it is not. Corruption classifications are based upon the corruption index in Glaeser and Saks (2006). High corruption states are states that rank 1-17 in the corruption index, medium corruption states are those that rank 18-33, and high corruption states are those that rank 34-50. "Share of governor's contribution from a firm's county" reflects the share of state-wide campaign contributions given to the current governor in the most recent election that came from the county where the firm is headquartered. The campaign contribution data for gubernatorial elections is from the Institute on Money in State Politics. Standard errors are in parentheses.