Local Overweighting and Underperformance: Evidence from Limited Partner Private Equity Investments*

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Institutional investors exhibit substantial home-state bias in private equity. This effect is particularly pronounced for public pension funds, where overweighting amounts to 9.7% of aggregate private-equity investments and 16.2% for the average limited partner. Public pension funds' in-state investments underperform by 2-4 percentage points, achieving worse performance than both their own out-of-state investments and investments in their state by out-of-state investors. Overweighting in home state investments by public pension funds is greater in states with higher levels of corruption, although in-state investments perform as poorly in less corrupt states as in more corrupt states. The overweighting and underperformance of local investments cost public pension funds $1.2 billion per year.

Keywords: Public Pension Funds, Private Equity, Home Bias, Limited Partner Performance Puzzle.

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1. Introduction

The allocations of institutional investors to alternative investment classes have risen substantially over the past decade. Public pension funds among the 1000 largest sponsors in 2010 allocated an average of 17.4% of their assets to alternatives, including 8.9% in venture capital and buyout and 5.5% in real estate.[1] At the average university endowment, alternatives in 2010 comprised 26% of the portfolio, approximately half of which is venture capital, buyout, and real estate.[2] Despite the sharp increase in the popularity and size of portfolio allocation to these asset classes, relatively few empirical papers have considered how institutional investors choose particular investments within these alternative asset classes, and how investment choice within these asset classes affects their performance.

In this paper, we examine allocation to and performance of investments by institutional investors serving as limited partners (LPs) in buyout funds, venture capital funds and real estate private equity funds, a class which we collectively refer to as private equity (PE). Institutional investors exhibit systematic differences across institutional types in returns and investment strategies within this asset class (Lerner, Schoar and Wongsunwai (2007)). In this paper, we attempt to quantify the extent and costs of a particular investment strategy, the preference for home-state investments.

A preference for geographically local equity investing by managers of domestic public equity within the U.S. has been documented by Coval and Moskowitz (1999), who show that the average U.S. mutual fund manager invests in companies that are physically closer by around 10% than the average firm that could have been held in the portfolio. In contemporaneous work, Brown, Pollet and Weisbenner (2011) document that a group of state pension plans that actively manage their own stock portfolios overweight the holdings of stocks of companies that are headquartered in-state, suggesting that local preference is likely relevant for at least some classes of institutional investors other than mutual funds. The possibility of home-state preference in the selection of PE investments, in combination with increasing overall allocations to PE by public pension funds, is of particular interest in light of evidence in Lerner, Schoar and Wongsunwai

[1] These are equal weighted statistics from *Pensions and Investments* http://www.pionline.com/article/20110207/CHART1/110229964/-1/specialreports.

[2] These are equal weighted statistics from the NACUBO 2010 Commonfund Endowment Study. The other half was marketable alternative strategies, i.e. hedge funds, absolute return, and derivatives. Value weighted there is a 52% allocation to alternatives, again with around half in private equity, hedge funds, and real estate.

(2007) that suggests public pension funds underperform other types of LPs in their in-state PE fund investments.

To examine institutional investor tendencies towards home-state PE investing, we employ an extensive dataset of LP investments in PE funds over the last 30 years. Combining these data with data on PE fund performance and location, we examine institutional investor allocations to home-state and out-of state PE funds, as well as their performance on those investments. As we are primarily interested in the location of the GPs—who receive the fee income from the investment—we focus on the location of the fund GP, rather than on where the capital is deployed by the GP.[3]

Our analysis suggests that institutional investors of all types (endowments, foundations, public and corporate pension funds) exhibit substantial home-state bias in their PE portfolios. An excess 8.1 percentage points of the total investments in institutional PE portfolios are in funds headquartered in the state of the LP, above and beyond the share that would be predicted in the population of investments by out-of-state LPs over the 5-year period leading up to each investment. For public pension funds, however, this over-allocation to in-state investment funds is substantially larger: the aggregate share of home-state public pension fund investments exceeds the predicted share by 9.7 percentage points, and the average public pension fund LP overweights its portfolio each year by 16.2 percentage points.[4] In contrast, aggregate home-state over-allocation by other types of institutional investors is substantially lower.[5]

The overweighting of public pension LPs in poorly performing local investments is particularly striking when one considers that risk management incentives should give public pension LPs a strong motivation against local concentration. If the performance of local

[3] Data on the underlying investments are not available fund-by-fund for most of our sample. It is well established that venture capital investment are made locally to the fund (Sorenson and Stuart (2001)), and there is some evidence that private real estate funds are also geographically specialized (Hochberg and Muhlhofer (2011)). In contrast, we speculate that buyout funds and funds in the 'other' category are probably less likely to invest locally.

[4] Larger LPs do less overweighting than smaller LPs, hence the difference between the equal weighted and value weighted statistics.

[5] Data on dollar value allocations to funds is only available for a little over half of the sample of investments, and coverage on these commitments is particularly poor for the non-public-pension LP classes. To exploit the full richness of the different types of institutional investors in the sample, our headline results employ the full sample and treat the investments as all of equal size, effectively equal-weighting the investments. However, we also show that the main results all go through for the categories with sufficient coverage if one focuses only on the smaller sample of investments for which the dollar value of the LP commitment is available (calculating overweighting as a share of total known commitments and value-weighting performance regressions by the size of the commitment).

investments is correlated with local economic conditions, then declines in the value of these local investments will come exactly at times when state revenues have declined and raising revenue for pension funding is most costly.

One possibility that would explain this overweighting is that public pension funds may be able to make use of local connections, networks and political access to gain better information than out-of-state investors on the prospects of funds located in their home-states, or to gain access to more and better funds in their home-states. If so, we would expect the in-state investments made by local public pension funds to perform better than the investments made in their home-state by out-of-state investors who lack such access. We may even observe that the in-state investments made by local public pension funds perform better than the investments made by these pension funds in out-of-state funds, as found in a public equity context by Coval and Moskowitz (2001), Baik et al (2010), and Brown et al (2011). Informational advantages might be expected to be particularly strong in the realm of private equity, an investment setting characterized by substantial asymmetric information.

When we examine the performance of in-state versus out-of-state PE investments, however, we find that state public pension funds underperform on their in-state investments by 3.75 percentage points relative to other investments in the same state and vintage, and 2.56 percentage points relative to investments in the same state, vintage, and investment type. Furthermore, they achieve worse performance than both their own out-of-state investments and investments by out-of-state LPs in their state. Thus, the overweighting of public pension fund portfolios in home-state investments does not appear to be due to superior information regarding home-state fund prospects. This contrasts with the findings in Brown et al (2011), who find that state pension funds outperform on at least some portion of their in-state public equity investments. Furthermore, this effect does not appear likely to be related to uncertainty aversion due to distance or lack of familiarity (Epstein and Miao (2003)). There is no difference in performance between out-of-state investments made by public pension fund LPs in immediately neighboring states and those made in non-neighboring states, and they do not overweight neighboring state investments.

When we perform a similar analysis for other types of institutional investors, we do not observe significant performance differences for these types, suggesting that despite evidence of some level of home-state bias in their investment choices, their performance is on average not

adversely affected.

Why do public pension funds overweight home-state investments that achieve poor performance? Home-state investments are often justified in the context of Economically Targeted Investment (ETI) programs, so a natural hypothesis is that public pension systems are subject to political pressures to invest in their home state. These pressures may be higher in states where self-dealing, corruption and quid pro quo activity is more commonplace. Public pension funds may also draw from a more limited pool of managerial talent, or have poor governance. To explore these hypotheses, we relate overweighting in home-state investments to measures of state-level corruption, education levels, prosperity, pension funding levels and pension board composition. We find that home-state overweighting by public pension funds is indeed higher in states with greater corruption, in less prosperous states, and for more underfunded pension systems, consistent with the idea that overweighting is likely to be related to political pressures, poor managerial talent or potential mismanagement. When we relate the performance of in-state investments to similar measures, we find that in-state investments in states with higher levels of education actually perform worse, while in-state investments in both more-corrupt and less-corrupt states perform similarly badly.[6]

Our final analysis attempts to quantify the hypothetical cost of such home bias by public pension funds. Our calculations suggest that if each public pension LP had performed as well on its in-state investments as out-of-state public pension LPs performed on investments in the same state, the public pension LPs would have reaped $1.25 billion annually in additional returns. If each public pension LP had performed as well on its in-state investments as it did out of state, then the total benefit would be $1.28 billion. While a $1.25 billion per year effect may seem small relative to the total assets under management by the public pension funds, it represents a non-negligible portion of annual contributions and total PE allocations. Averaged equally across the 50 states, the financial effects of these biases represent 0.6-0.7% of the assets in the private equity programs per year and 1.8-1.9% of annual contributions to the pension funds.

[6] A scenario that would be consistent with these findings is one where public pension funds faced a hard requirement to allocate a specific percentage of their overall assets to the PE asset class, are rationed from the best funds in all states, but are able through local networks to gain allocations in poor funds in-state that are otherwise unattractive to investors (and which may, due to political influence, have been created specifically in order to benefit from this type of situation).

A caveat to this cost analysis is that data on actual dollar value allocations fund-by-fund is not available for the full sample. As an alternative, we have performed value-weighted cost analysis on public sector pension funds using only the investments for which commitment levels are available, and then extrapolating to the rest of the PE portfolio. The results are highly robust to considering the relative size of investments in this way, generating almost the same aggregate costs. However, the selection in disclosure of commitment levels in some key states (particularly New York) appears to favor the worse-performing investments, suggesting that the equal-weighted cost analysis provides a more accurate picture state-by-state.

Notably, our analysis does not address the welfare implications of home-state investments by public pension funds. As noted by Lerner, Schoar and Wongsunwai (2007), public pension funds may face political pressures to invest in in-state funds in an effort to support the local economy even if doing so reduces return on investment. It is possible that positive externalities for residents, taxpayers and public sector retirees due to the local economic development resulting from these investments (e.g. Mollica and Zingales (2007)) may offset the lower returns earned by the public pension fund. As such, we do not argue that the home bias and underperformance on home-state investments documented by our analysis is suboptimal. Rather, we document the extent and potential financial effect of the home bias, and leave explorations of net welfare to future research. We note that the overweighting and underperformance of public pension funds is largest in venture capital and real estate, where, in contrast to leveraged buyouts, positive externalities for local economic development are more plausible.

The contribution of our work is fourfold. First, to the best of our knowledge, this is the first study to perform a detailed examination of home bias in LP investments in the PE industry. Our work is thus related more generally to the literature on LP investments in private equity funds (Gompers and Lerner (1996), Lerner and Schoar (2004), Hochberg, Ljungqvist and Vissing-Jorgensen (2011)). Lerner, Schoar and Wongsunwai (2007) explore heterogeneity in the returns that different classes of institutional investors earn when investing in private equity and suggest that LPs vary in their level of sophistication. Large open questions remain, however, as to the drivers and consequences of the decisions by individual LPs to invest in private equity

funds, and our work sheds some light on these open issues.[7]

A second and related contribution of our work is to expand upon and shed light on a possible contributor to the limited partner performance puzzle documented by Lerner, Schoar and Wongsunwai (2007). From that literature, it is known that endowments earn much higher returns on their PE investments than do other types of institutional investors. While Lerner et al (2007) show that endowment outperformance is not due solely to regional investments, our results are the first to fully quantify the role of underperformance of local investments on the relatively poor performance of public pension funds.

A third contribution is to the literature on the local bias for institutional investors, such as French and Poterba (1991), Coval and Moskowitz (1999, 2001) and Brown, Pollet and Weisbenner (2011).[8] In contrast to Brown, Pollet and Weisbenner (2011), who examine public equity investments by 20 state pension plans who actively manage their own public equity portfolios, we focus on all classes of institutional investors, and examine PE investments rather than publicly traded stock holdings. While both our analysis and that of Brown et al (2011) suggest that public pension funds exhibit substantial home bias in their investment choices, and that this home bias is larger in states with higher levels of corruption, Brown et al (2011) find that public pension funds outperform on a particular segment of their in-state public equity investments, whereas we find that public pensions perform decisively worse on their in-state private equity investments. To our knowledge, ours is the first paper to document a substantial negative return to local investment preferences.

Our final contribution is to an emerging literature on public pension fund governance. Public pension systems are underfunded by $3 trillion (Novy-Marx and Rauh (2011)) and operate under an accounting regime that rewards the taking of risks that allow funds to assume high expected returns. The relation between public pension fund governance and overall performance has been studied by Mitchell and Hsin (1994) and Coronado, Engen, and Knight (2003). We examine whether state-level and fund-level governance characteristics can help

[7] A large literature, beginning with Kaplan and Schoar (2005), explores the performance of private equity funds and investments and the relationship between performance and subsequent fundraising. Notable papers include Jones and Rhodes-Kropf (2003), Ljungqvist and Richardson (2003), Cochrane (2005), Korteweg and Sorensen (2010), Quigley and Woodward (2003), Gottschalg and Phalippou (2009), and Hochberg et al (2011).

[8] Other related work in this includes Strong and Xu (2003), who find that international home bias is a function of optimistic attitudes about home country performance, and Graham, Harvey and Huang (2009), who show that local bias is correlated with lower self-confidence regarding investment competence.

understand the patterns of local overweighting and underperformance in PE.

The remainder of this paper is organized as follows. Section 1 describes our data and sample. Section 2 presents the empirical analysis of home bias. Section 3 relates home-bias to state-level corruption. Section 4 analyzes the costs of public pension fund home bias. Section 5 discusses and concludes.

1. Data

The bulk of institutional investment in private equity is made via legally separate, funds run by professional managers (referred to as the GPs), as the selection of appropriate direct investments requires resources and specialized human capital that few institutional investors have. PE funds are raised for a specified period (typically a 10-12 year, with possibility for shorter extensions) and are governed by partnership agreements between the investors and the fund's principals. The agreement specifies the nature of the fund's activities, the division of the proceeds, and so forth. Private equity groups typically raise a fund every few years.

To examine the investment patterns and investment performance of LPs, we construct a sample of PE fund investments by institutional investors over the period 1980-2009 using data obtained from four major sources: Thomson Reuters' Venture Economics (VE), Private Equity Intelligence (Preqin), VentureOne (V1) and Capital IQ (CIQ). None of the four data sources provides complete coverage of any given LP's investments, or of the LPs in any given fund, a drawback noted by Lerner, Schoar and Wongsunwai (2007), who use VE data in a related exercise, and Hochberg, Ljungqvist and Vissing-Jorgensen (2011), who employ similar data for VC funds to test an informational hold-up model. We obtain performance data for the funds, in the form of net IRRs and multiples of committed capital, from Preqin. Data on the location, portfolio size and type of institutional investor, as well as information on the location of the PE funds are obtained from a combination of the above four sources.

One drawback of this type of data is that data on the size of the investment, i.e. the commitment by the LP to the fund, is generally incomplete. In our sample, the size of the commitment is available for roughly half of the observations. For public pensions, the coverage is roughly 80%, whereas for the other LP types it is substantially below 50%. This difference likely results from the fact that public pension funds, by virtue of being public sector entities, are more likely to be required to report commitment levels under state public records laws. In order

to exploit the richness of the data on different types of investor classes, our headline results use the full sample and treat the investments as all of equal size, effectively equal-weighting the investments. However, we show that the main results all go through for the LP categories with sufficient coverage, and are quantitatively quite similar if one focuses only on the smaller sample of investments for which the dollar value of the LP commitment is available, that is, if we calculate overweighting as a share of total known commitments and value-weight all performance regressions by the size of the commitment, including only observations for which we actually have commitment data.

As can be seen in Table 1, combining the four private equity data sources and retaining only observations with available location data gives us 18,828 investments by 631 unique LPs investing in 3,553 PE funds.[9] The top panel of Table 1 shows the number of investments by source and investment type. Of these 18,828 observations, roughly 57 percent are present in Preqin only, 11 percent are present in both Preqin and VE/V1, 13 percent are present in both Preqin and Capital IQ, and 7 percent are present in all three datasets. Thus, Preqin alone would cover 89 percent of the investments in our sample. The remaining 11 percent of the sample is represented by 2,210 observations, of which 1,024 are present in Capital IQ only, 380 are in VE/V1 only, and 806 are in both Capital IQ and VE/V1. Thus, Capital IQ alone would cover 29 percent of the observations in the sample, and VE/V1 alone would cover around 25 percent of the observations in the sample.

The bottom panel of Table 1 shows the investments sample broken down by type of PE fund. Thirty percent of the investments are buyout investments, 30 percent are VC investments, and 13 percent are real estate. The remaining 27 percent are other types of PE funds, including funds of funds, distressed debt, mezzanine, and natural resources investments. As noted, throughout this paper we refer to investments in VC, buyout, real estate, and all other private fund type categories as private equity or PE investments.

Appendix Table A1 presents the number of investments by type of LP and by type of investment. Investments by public sector pension funds comprise 11,799 observations, or 63 percent of the sample. Endowments have a heavier allocation to VC than either public or private pension funds, with 40% of endowment investments going towards this investment type.

[9] For comparison, in their analysis, Lerner, Schoar and Wongsunwai employ a dataset from VE alone comprised of 4618 investments in 838 funds by 352 LPs.

Compared to public pensions, endowments invest less in buyout (26 percent of investments versus 32 percent) and less in real estate (8 percent of investments compared to 16 percent). The heavy weighting on VC is particularly apparent in the endowments of private institutions, where over half of investments are in VC.

Table 2 presents summary statistics for our sample. Panel A presents summary statistics for the IRR net of fees returned by funds invested in, broken out by institutional investor type and by investment type for the 14,881 observations for which we have performance data. Funds invested in by endowments return a mean (median) net IRR of 12.01% (6.10%), and those invested in by foundations return 9.78% (6.30%). PE funds invested in by private sector pension funds return a mean (median) IRR of 8.41% (6.45%), while those invested in by public sector pension funds return a mean (median) IRR of 5.78% (5.00%). Over our sample period, the buyout investments in our sample returned a mean (median) net IRR of 7.42% (8.30%), while the venture investments in our sample returned a mean (median) net IRR of 11.54% (2.00%). Over the same period, real estate funds returned a net IRR of -7.27% (-0.9%), and funds in the 'other' category returned a net IRR of 9.15% (8.40%).

Panel A of Table 2 also presents summary statistics for an alternative performance measure, the net of fees multiple of committed capital returned by PE funds, again broken out by institutional investor type and by investment type. Funds invested in by endowments return a mean multiple of 1.79x, while those invested in by foundations return a mean multiple of 1.66x. PE funds invested in by private sector pension funds return a mean multiple of 1.57x, while those invested in by public sector pension funds return a mean multiple of 1.36x. Buyout funds during our sample period returned a mean multiple of 1.41x, venture capital funds returned a mean multiple of 1.93x, real estate funds returned a mean multiple of 0.96x and funds in the 'other' category returned a mean multiple of 1.34x.

Panel B of Table 2 breaks out the number of observations in our sample by type of institutional investor, type of investment, and PE fund vintage year sub-periods. Consistent with the growth of the PE sector since the 1980s, the bulk of our sample observations are investments by LPs in funds from vintage years in the 1990s (5,519 investments) or 2000s (12,557 investments), with a smaller proportion of investments made during the 1980s. Public pension fund investments represent the largest portion of our sample (11,797 investments), followed by endowments (2,958 investments) and foundations (2,953 investments).

Panel C of Table 2 presents summary statistics for the size of the institutional investor's portfolio at the end of our sample period, 2009, as well as the size (total committed capital) of the PE funds in our sample, and the individual commitment amounts associated with our sample investments, where available. Pension funds, both private and public sector, have the largest portfolio sizes on average, at $1.186 billion and $1.176 billion, respectively. Buyout funds, unsurprisingly, have the largest fund sizes in our sample, with an average of $1.228 billion in committed capital per fund. Average commitment sizes vary widely by LP type, from $6.32 million for the average foundation investment (131 investments with available commitment data), $14.9 million for the average endowment investment (984 investments with available commitment data), $49.3 million for the average public pension fund investments (9,705 investments with available commitment data), and up to an average of $232 million for the 13 investments by private pension funds for which we have commitment data (median commitment size of $40 million).

Finally, Panel D of Table 2 presents summary statistics for the explanatory variables used in our analysis of the determinants of overweighting and underperformance. These variables are obtained from a variety of sources.

The first group of statistics in Panel D shows state-level governance measures. We obtain our primary governance measure from Glaeser and Saks (2006), who derive corruption levels from the Justice Department's "Report to Congress on the Activities and Operations of the Public Integrity Section," a listing of the number of federal, state and local public officials convicted of a corruption-related crime by state. They divide these convictions by average state population from the 1999 and 2000 Census to obtain an estimate of the state corruption rate per capita. We refer to the Glaeser-Saks measure as the GS measure. Alaska ranks as the most corrupt state in their ranking, followed by Mississippi, Louisiana and South Dakota. The least corrupt states in the GS ranking are Oregon, Washington, Vermont and Minnesota.

A drawback of the GS measure of corruption is that it reflects the enforcement of corruption, which could even be correlated with good governance. A second measure of state-level corruption is therefore taken from the survey of state corruption by Boylan and Long (2003) as covered in the New York Times by Marsh (2008). The survey by Boylan and Long (henceforth BL), completed in 2003, asks state house reporters to assess state officials and rank their state in terms of corruption on a scale of 1 (clean) to 7 (crooked). In three states,

correspondents chose not to respond to the survey. Both the BL survey ranking and the indicator for non-response to the BL survey correlate highly with the GS corruption rate levels. As shown in Panel D, the mean state in our sample (excluding WY due to lack of WY LPs in our sample, and excluding DC for the Glaeser-Saks data) has a GS corruption index level of 0.28, a NYT survey corruption score of 3.22, and a non-response to NYT survey rate of 0.08.

The second group of statistics in Panel D shows economic variables at the state-by-year level. Data on Gross Domestic Product (GSP) is obtained from the Bureau of Economic Analysis (BEA), and population is from the U.S. Census Department. Data on education at the state level is also obtained from the Census, which reports the percentage of each state's population, aged 25 years and older that holds a Bachelors degree or higher. The Census reports these data for each decade starting in 1940, and we assign education levels to observations in our data based on the vintage decade and state of the LP.

The mean state has a population of 6,129,246, where the populations are measured as of 2009, and an annual average Gross State Product (GSP) of $0.21 trillion. Growth in nominal GSP is measured by year from 1980-2009. Over our sample period, on average, 21.7% of a state's population aged 25 and over held a Bachelor's degree or higher.

Data on LP characteristics are obtained from a variety of sources. The earliest date of LP investment in PE is obtained simply by calculating the earliest date in which an investment by a given LP appears in our sample. This data item is available for all LP types. The other LP characteristics are for public pension funds only. The data on whether a public pension fund represents teachers, public safety officials, both, or neither comes from the Center for Retirement Research (2006), augmented by additional collection from state and local government reports, based on the name of the pension fund. State level pension contributions and funding ratios are obtained from the dataset of Novy-Marx and Rauh (2011). The size and composition of public pension boards are manually collected from the annual reports of the public pension systems themselves, and we use this information to calculate the ratio of political appointees and ex officio members to total members on the pension fund investment board. We define this ratio as a Board Capture Ratio, a possible proxy for the extent to which political interests are represented.

At the LP level, the mean LP in our sample began investing in PE in 1996. 22% of the public sector LPs in our sample represent teachers, and 34% represent public safety workers. The

ratio of political appointees and ex officio members to total members on the investment board of public pension funds in our sample averages 55%, and the mean funding ratio for these public pension funds stands at 0.76.

As a prelude to our main results, we examine the raw geographical distribution of investments. Perhaps unsurprisingly, given that we focus on the broad category of PE funds, when we examine the geographical distribution of investments in our sample, we observe that the highest proportion of our sample investments are in funds headquartered in CA (25.84%), followed by NY (23.37%) and MA (16.9%). Appendix Table A2 presents the geographical distribution of our sample investments, by the state where the fund is headquartered. Nine states have no PE funds in which investments were made in our sample (AK, HI, KS, MS, MT, ND, NV, SD and WV) and hence are not shown.

In columns (2) and (3) of Appendix Table A2, we separate investments into those made by in-state LPs and those made by out-of-state LPs. 15,678 of the 18,828 investments in our sample are made by LPs who are not located in the same state as the fund they are investing in. The remaining 3,150 investments are made by LPs from the same state as the fund they are investing in. We call investments made by LPs from the same state as the fund they are investing in *in-state* investments. Of the 3,150 in-state investments, 37.87% of them are in California, 17.37% are in New York, and 12.89% are in Massachusetts. These percentages reflect both the extent of LP private equity portfolios in the state and the tendency of these LPs to invest within the state. Appendix Table A3 shows analogous calculations weighted by committed capital for observations which committed capital is available.

2. Empirical Analysis of Overweighting and Performance

We begin our analysis by examining the overweighting of LPs with respect to their local geography. We quantify this overweighting by type of LP, finding a particularly strong effect among public pension funds, as compared to private sector pension funds, endowments, and foundations. We also examine how this effect varies among different types of investment: buyout, venture, real estate, and other. We then examine performance differences between in-state and out-of-state investments for different types of LPs and funds.

3.1. Overweighting of In-State PE Investments: Analysis Pooled Over Time

There are several possible benchmarks for the share of an LP's PE investments that would be expected to be in-state if there were no home state overweighting. We focus on two benchmarks. The first is the share of all investments that are in the state in question in a specific time period. Consider, for example, Minnesota, a state chosen at random, and a time period covering the entire sample period. Appendix Table A2 shows that across all investments in our sample, 0.79% are investments in funds that are located in Minnesota. The first benchmark thus would imply that if Minnesota LP investors behave like the average LP investor around the country, only 0.79% of their portfolio over the sample period would be expected to be in funds located in Minnesota. We call this benchmark the *overall state share*.

The drawback of the overall state share is that it will be biased upwards if the state itself overweights local investments, and it will be biased downwards if the other states that invest in the state particularly overweight their own local investments. To see this, suppose that all the states investing in Minnesota had a 10% overweighting of their own funds. Then the Minnesota share of those other states should really be divided by 0.9 to reflect the expected portfolio without home bias.

The second benchmark we consider is therefore the share of all non in-state investments that are investments in the state in question in a given time period. Following our previous example, Appendix Table A2 shows that excluding in-state investments, 0.68% of the PE investments in the sample period are in Minnesota. The second benchmark would imply, therefore, that if Minnesota LP investors had the same geographical investment distribution as the average LP investor does in its out-of-state investments over the course of the sample period, only 0.68% of their pooled portfolio over the sample period should be in Minnesota funds. We call this benchmark the *state's share of all out-of-state investments*.

As a first cut, we can begin by examining in-state overweighting by LPs, pooling the investment sample across time. Column (1) of Appendix Table A4 presents the equal-weighted investment share by LPs, by state of the LP investor, and Column (2) shows the in-state bias relative to the first benchmark, the overall state share, based on the pooled sample. Continuing the Minnesota example, if Minnesota LP portfolios employed the same geographical investment distribution as the LP average across the country over the course of the sample, they would be expected to invest 0.8% of their pooled portfolio in Minnesota investments. If Minnesota LP portfolios employed the same geographical investment distribution as the LP average across the

country for out-of-state investments only, they would be expected to invest 0.7% of the portfolio in Minnesota investments. In fact, since Minnesota invests 9.7% of the PE portfolio in Minnesota funds, they have an overweighting of 8.9% of the portfolio (=9.7% - 0.8%) relative to the overall state share (the first benchmark) and 9.0% of the portfolio (=9.7% - 0.7%) relative to the state's share of out-of-state investments (the second benchmark). The state with the most overweighting in the pooled sample is Massachusetts. Over 40% of the PE investments of LPs located in Massachusetts are in Massachusetts-based PE funds.

The right columns of Appendix Table A4 show a value-weighted version of the analysis for the sub-sample for which we have information on the size of the LP commitment. This panel looks at the overweighting as a function of total known committed dollars, rather than of the total number of investments, and we find broadly similar results.

3.2. Overweighting of In-State PE Investments: 5-Year Rolling Benchmarks

If geographical investment patterns change over time, it is useful to examine the home-state overweighting on a rolling basis over the several years preceding any given vintage, as opposed to over the entire sample. Given the structure of the data and the nature of PE investments, we do this relative to the previous five years of investment activity.

Table 3 presents this analysis. Here the level of calculation is the [LP x Vintage], where only [LP x Vintage] observations for which there is a PE investment are included. For each [LP x Vintage], we calculate an excess share of home-state investments over the preceding five years, relative to both the overall state share during that time period and the state's share of out-of-state investments during that time period.

The results in Table 3 are qualitatively similar to, and in fact stronger than, those obtained when pooling the sample investments over time. Here, the state with the highest level of overweighting on an equal-weighted basis is Ohio, with a home bias that averages 32.4% of its PE portfolio relative to the overall state share and 33.1% share relative to the state's share of all out-of-state investments (both based on the preceding five years of investment). After Ohio, the states with the largest home bias based on the rolling five year benchmark are Massachusetts (31.7% versus overall state share, 31.0% versus share of out-of-state investments), Illinois (22.3%, 22.7%), Tennessee (18.9%, 18.9%), Pennsylvania (16.0%, 16.7%), California (13.2%, 15.2%), Minnesota (13.3%, 13.5%) and Texas (13.1%, 13.0%). In all, there are eleven states

with a local state overweighting that averages more than 10% of their PE portfolio on a rolling five year basis.

The right-hand columns of Table 3 present a value-weighted version of the analysis for the subsample for which we have information on the size of the LP commitment to the fund. Here, we compute overweighting as a function of the total known committed dollars, rather than total number of investments. As was the case for the sample pooled over time, we again find broadly similar results to the equal-weighted analysis.

An alternative way to view overweighting is to calculate the excess home-state overweighting as a percentage of the benchmark, rather than as a difference versus the benchmark. Appendix Table A5 presents the equal-weighted and value-weighted home-state bias of the portfolios of LPs located in each state, calculating overweighting as a multiple of the benchmark. Thus, multiples greater than one indicate overweighting, and one minus the multiple represents the home-state overweighting as a fraction of the benchmark. A multiple relative to out-of-state LP investments can only be calculated if there are out-of-state LP investments during the five years leading up to the year of observation. For that reason, the table presents two sets of observation counts: one for all LP-vintage year observations in which there was an investment, and one for only those LP-vintage year observations in which the out-of-state benchmark is nonzero.

Using the pooled measures for the purposes of a simplified example, the benefit of measuring overweighting in this fashion is that the measure then captures the fact that when Indiana LPs observe a 5 percentage point home-state overweighting according to our main measure, this represents a 5.0/0.2 = 2500% overweighting versus the 0.2% benchmark of overall state share for Indiana. In contrast, the 4.6 percentage point excess share of home-state investment for New York LPs represents only a 4.6/23.4 = 20% overweighting versus the 23.4% benchmark of overall state share for New York LPs. States with small PE programs that, percentage-wise, are highly invested in their home state, will look much worse using this measure. The drawback of such a measure, however, is that it sharply magnifies overweighting for states with a small overall state share of investments in the sample. Furthermore, this multiple approach leads to a highly skewed measure, which makes it unsuitable for linear regression analysis.

There is a large amount of variation in the home-state overweighting multiple across LPs

in the different states. The states with the lowest overweighting multiples are Delaware, Maine, Oklahoma and Vermont, who each underweight their own-state investments by 100%, in that they have no in-state investments despite receiving some investments from outside investors. At the other extreme, all sample PE investments by Arizona and Louisiana LPs are in-state investments.

The next logical question is the extent to which the in-state overweighting is concentrated in certain types of LPs, or in certain types of investments. Table 4 examines home-state overweighting for the sample overall as well as by LP type, calculated in two manners: at the investment level, and at the LP-vintage year level. The first row of the top panel of Table 4 shows the mean and standard error of the mean for the in-state investment indicator over all the 18,828 investments in the full sample. The second row of Table 4 shows the same statistics for the 18,102 observations for which funds exist in the state of the LP. That is, this sample excludes investments by LPs in states for which there were no PE funds that any LP in the sample invested in (AK, HI, KS, MS, MT, ND, NV, SD and WV). The next two sets of columns present the excess in-state LP portfolio weighting versus both benchmarks: the overall state share and the share of out-of-state investments, calculated for each investment as the in-state indicator for that investment minus the benchmark based on investments in the preceding 5 year period, and averaged over the sample. We observe that here there is a 7.8 percentage point overweighting relative to the overall state share, and an 8.1 percentage point overweighting relative to the state's share of all out-of-state investments, both statistically significant at the 1% level.

In the second half of the top panel of Table 4, we present means and associated standard errors by LP type for the in-state share and the differences between the in-state investment share and the two benchmarks, along with t-tests of statistical significance. Public pension funds overweight in-state investments by 9.2 to 9.7 percentage points on average. Endowments overweight in-state investments by 6.7 percentage points on average. Private sector pension funds overweight in-state investments by 6.2 to 6.5 percentage points on average. Foundations overweight in-state investments by 3.7 to 3.8 percentage points on average. The final column of Table 4 shows a statistical test of whether each LP type is statistically different from the public pensions, and indeed we see that there is a statistically significant difference of 3 to 6 percentage points between public pension LPs and other LPs when it comes to this local overweighting when calculated at the investment level.

In the bottom panel of Table 4, we instead calculate home-state overweighting at the LP-vintage year level. The distinction between this calculation and the calculation at the investment level is that the investment level analysis weights each LP-vintage year by the number of investments made by the particular LP in that year, while the LP-vintage year analysis treats each LP-vintage year as an equally-weighted observation.

The first row of the panel shows the mean and standard error of the mean for the in-state investment indicator over all 4,589 LP-vintage years in the full sample. The second row of Table 4 shows the same statistics for the 4,426 LP-vintage years for which funds exist in the state of the LP, analogous to the second row of the top panel of the table. The next two sets of columns then present the excess in-state LP portfolio weighting versus both benchmarks: the overall state share and the share of out-of-state investments, calculated for each LP-vintage year as the difference between that LP's allocation to their home-state in the preceding 5-year period minus the benchmark based on investments in the preceding 5-year period, and averaged over the sample. Here, in the full sample, we observe an 11.7 percentage point overweighting relative to the overall state share, and an 11.8 percentage point overweighting relative to the state's share of all out-of-state investments, both statistically significant at the 1% level. As will be seen momentarily, the fact that the overweighting is higher when calculated at the LP-vintage level compared to the investment level reflects the fact that LPs with larger allocations to PE do less overweighting. Hence, when the LPs are equally weighted, the average overweighting is higher than when the investments are equally weighted.

In the second part of the bottom panel of Table 4, we present means and associated standard errors by LP type for the in-state share calculated at the LP-vintage year level, as well as the differences between the in-state investment share and the two benchmarks, along with t-tests of statistical significance. In the average LP year, a public pension fund in the sample overweights its home-state investments by 16.0 percentage points relative to the overall state share, and 16.2 percentage points relative to the state's share of all out-of-state investments, both statistically significant at the 1% level. For private pension LPs, average overweighting is approximately 7 percentage points, for endowments, 8 percentage points, and for foundations, 9 percentage points. Relative to other LP types, public pension funds overweight in-state investments by between 6.9 and 8.2 percentage points when averaging across LP-vintage years, statistically significant at the 1% level.

We note that it is possible that there is an optimal level of home-state overweighting. If one believes that this optimal level of home-state overweighting is best revealed by higher-performing LP types, such as endowments or foundations (Lerner, Schoar and Wongsunwai (2007)), then one can consider these differences between the portfolio allocation weights of public pension funds and endowments or foundations as being reflective of excess overweighting by public pensions, rather than the raw overweighting relative to the benchmarks.

The bottom portion of the bottom panel of Table 4 presents similar calculations for all LPs, public pension fund LPs and non-public pension fund LPs, weighted by commitment size, for the 1,638 public pension fund LP-years and 375 non-public pension fund LP-years for which we have available (some) commitment size data. Appendix Table A6 provides the results of a similar analysis using overweighting multiples, and we observe similar patterns.[10]

Combining all four sub-asset classes of PE funds, however, may mask important empirical patterns. In particular, as we saw in Appendix Table A1, LP types differ in their relative portfolio allocations to each of these sub-asset classes. The next sets of statistics, presented in Table 5, show the means, standard errors, differences, and statistical tests by the type of investment (buyout, venture, real estate, or other), and also within each investment type by the type of LP investor.

As in the second half of Table 4, the unit of observation in Table 5 is an LP-vintage year. Public pensions display an 8.2 to 8.5 percentage point home-state overweighting in buyout, a 23.5 to 23.7 percentage point home-state overweighting in venture capital, a 19.4 to 20.1 percentage point home-state overweighting in real estate, and a 7.2 to 7.6 percentage point home-state overweighting in the other types of investments. It thus appears that public pension funds most overweight in-state venture investments and real estate investments, with in-state investments in the "other" category and in buyout overweighted to a lesser extent.

Within these investment types, there are generally significant differences between the extent of public pension overweighting of in-state investments and the extent of overweighting by other types of LPs. In venture capital, the 23.7 percentage point public pension overweighting

[10] In Appendix Table A6, we further break the overweighting multiples down by LP type. As in Table 4, we calculate the overweighting multiples first by investment (in the top panel) and then by LP-vintage year (in the bottom panel). As in Table 4, we observe the same general pattern: all LP types appear to overweight home-state investments, but public pension funds do so to a significantly greater extent than other LP types, with the exception here of foundations, with whom the difference using the multiple approach is statistically insignificant.

(using the second benchmark) is 18.3 percentage points greater than the overweighting seen in private pensions, 11.5 percentage points greater than the overweighting seen in endowments, and 12.4 percentage points greater than the overweighting seen in foundations. Private pensions, endowments, and foundations do still overweight venture capital, but not to nearly as large an extent as public pension funds. A similar statement holds for real estate, although private pension funds are closer to public pension fund LPs in this category. Note that these patterns are consistent with home-state overweighting precisely in types of PE funds that are likely to invest their capital locally, consistent with the oft-used justification of home-state investment in the context of Economically Targeted Investment (ETI) programs.

In buyout, the in-state overweighting by public pension LPs is closer to the in-state overweighting of other types of LP investors. For public pensions, the overweighting is 8.5 percentage points on the second benchmark, compared to 5.4-5.9 percentage points for the other categories. In the "other" category of investments, it appears that public and private pension LPs do the most in-state overweighting, with foundations doing only slightly less.

Appendix Table A7 presents a similar analysis at the investment level, with similar results in terms of the relative overweighting of the different types of investment. In buyout, the in-state overweighting by public pension LPs in aggregate is in fact no greater than the in-state overweighting of other types of LP investors.

The bottom panel of Table 5 presents the means, standard errors, differences, and statistical tests of overweighting, broken down by decade. We observe statistically significant overweighting of home-state investments in all three decades: 18.4% excess in the 1980s, 14.8% excess in the 1990s, and 9.7% excess in the 2000s. On an investment-weighted aggregate basis, the overweighting is 12.5% for the 1980s, 9.8% for the 1990s, and 11.7% for the 2000s, as shown in Appendix Table A7.

Overall, Tables 4 and 5 present a clear picture of substantial overweighting of in-state investments, particularly by public pension funds investing in venture capital and real estate, but also across the board for other LP types and investment types. The analysis in these tables, however, treats all observations as independent. In practice, however, observations for a given LP over time may be correlated, in particular if there is serial correlation in investment strategies. Additionally, public pensions differ from other LP types along a number of dimensions, particularly size of assets under management, which may be related to over-weighting and

therefore confound the analysis.

In Table 6, we therefore perform similar-minded tests in regression form; specifically, we perform panel regressions in which the dependent variable is the LP's excess share of in-state investments over the previous five years, relative to the benchmark representing the share of investments in the state by out-of-state LP's over the preceding five year period. The unit of observation is an LP-vintage year. The independent variables of interest are indicator variables for LP type (the omitted category is foundations).

Because public pensions differ significantly from other LP types on the portfolio size dimension, we include the natural logarithm of the size the LP's private equity portfolio in dollar terms. Furthermore, as late entry into the PE asset class may limit the funds to which an institutional investor can gain access (Hochberg, Ljungqvist and Vissing Jorgensen (2011)), we control for the first vintage year in which the LP became active in investing in PE. In all models, we include vintage year fixed effects. In the second column, we add state fixed effects, to identify overweighting solely off within-state variation across LP types, and in the third and fourth columns, we add broad and narrow investment type fixed effects, so as to identify any overweighting solely of within-state and within investment type variation across LP types. The broad investment type indicators are for buyout, venture capital, real estate, and other. The narrow investment type indicators are for buyout, early stage VC, general/late stage VC, real estate, fund of funds, distressed debt, natural resources, and other. Due to our concerns about serial correlation in LP investment strategies, standard errors are clustered by LP, although we in fact obtain even stronger statistical significance when clustering by vintage year, and we obtain very similar statistical significance and coefficients when clustering two-way (Petersen (2010)) by LP and vintage year.[11]

Looking at the estimates from the regression models in Table 6, we observe similar patterns to those documented in Tables 4 and 5. The coefficient on the public pension fund indicator in all four is positive and significant at the 1% level, with a magnitude that ranges from 8.4 to 13.5 percent. The coefficients on the indicators for private pensions and public are considerably smaller and statistically insignificant, suggesting that public institution endowments and private pensions do not differ significantly from foundations in their in-state overweighting.

[11] Two-way clustering as implemented in Petersen (2010) requires us to eliminate the vintage year fixed effects.

For private endowments, we actually observe a weakly statistically significant negative coefficient, suggesting that, if anything, private institution endowments overweight less than foundations (the omitted category).

The coefficients on the size of the LP's portfolio are highly statistically significant, reflecting the fact that LPs with larger amounts of PE to invest do less in-state overweighting, other things equal. A one standard-deviation increase in *ln(Size of LP's PE Portfolio)* is correlated with a reduction in overweighting by between 2.8 (=0.015*1.9) and 4.8 (= 0.025*1.9) percentage points depending on the model.

Consistent with the notion that investors who are 'late to the game' in PE may face a restricted investment set (Hochberg, Ljungqvist and Vissing Jorgensen (2011)), in three of the models, we observe a positive relationship between the year in which the LP first began investing in PE and their tendency to overweight home-state investments. Overall, the estimates in Table 6 suggest that the overweighting by public pension LPs observed in Tables 4 and 5 is truly present for these public pension LPs, rather than being an artifact of their size or investment history in the asset class.

Finally, we examine whether LPs exhibit similar overweighting of investments in immediately neighboring states, and thus whether overweighting may reflect a familiarity bias. Appendix Table A8 repeats the analysis in Table 4, employing investments in immediately neighboring states rather than in the LP's home-state. Public pensions display very little overweighting of investments in immediately neighboring states; when calculated at the investment level, public pension fund excess share in neighboring states is 0.00% versus the share of investments in those neighboring states by all LPs, and significantly negative -1.1%, or an *underweighting* of neighboring state investments versus the share of investments in neighboring states by out-of-state LPs. Calculated at the LP-vintage-year level, public pensions exhibit a statistically significant mean excess share of investment in immediately neighboring states of only 1%, and an excess share of investment of 0.00% versus the share of investments in neighboring states by out-of-state LPs. In contrast, all other LP types exhibit significant, positive overweighting of investments in immediately neighboring states, ranging from 3% to 9% depending on whether we average overweighting across individual investments or across LP-vintage year and depending on the benchmark employed. As can be seen from the right-most column of the table, relative to other LP types, public pension funds appear to underweight

neighboring state investments.

3.3. Underperformance of In-State Investments

We next ask how in-state investments perform relative to out-of-state investments. One possibility is that public pension funds are able to make use of local connections, networks and political access to gain better information than out-of-state investors on the prospects of funds located in their home-states, or to gain access to more and better funds in their home-states. If so, we would expect the in-state investments made by local public pension funds to perform better than the investments made in their home-state by out-of-state investors who lack such access; we may even observe that the in-state investments made by local public pension funds perform better than the investments made by these same pension fund managers in out-of-state funds. Indeed, Coval and Moskowitz (2001) find that U.S. mutual fund managers of public equities earn substantial abnormal positive returns in their local investments in public equities, due to informational advantages. Such informational advantages might be expected to be particularly strong in the realm of private equity, an investment setting characterized by substantial asymmetric information.

Table 7 shows t-tests of differences in net IRR between in-state and out-of-state investments. The left panel analyzes the net IRR minus the mean of all other observations in the same state and vintage year of the investment fund (the GP), the middle panel examines the net IRR minus the mean of all other observations in the same state, vintage and broad investment type of the investment fund (i.e. buyout, venture capital, etc.), and the right panel examines the net IRR minus the mean of all other investments in the same state, vintage and narrow investment type of the fund (early stage VC, later stage VC, etc.). Controlling in this fashion for the state, vintage year and type of the fund is analogous to including a fixed effect for these factors. This is important as expected return and risk may vary over time, by state, and by the type of investment.

Each set of three rows consists of a row of means, a row of standard deviations, and a third row with observation counts and t-statistics. The t-statistic is for the test with null hypothesis that the difference between the out-of-state IRRs and the in-state IRRs equals zero. The first three rows consider all observations, the next set of three rows considers only public pensions, the next set of rows considers only private pensions, and so forth.

The left side of the top panel of the table shows that in terms of net IRR in excess of the vintage mean, out-of-state investments outperform in-state investments by 2.87 percentage points, and that the difference is statistically significant with a t-statistic of 5.4. The middle of the top panel of the table examines the same comparison but with respect to the IRR minus the mean of all other investments in the same state, vintage and broad investment type. This is analogous to a regression with state-by-vintage-by-type fixed effects, and tests whether LPs actually do worse when investing in their home state than other investors do when investing in the same state and investment type. Here, out-of-state investments outperform in-state investments by 2.02 percentage points, and the difference is statistically significant with a t-statistic of 4.6. Adjusting further for the more narrow definition of the investment type of the fund in question, out-of-state state investments outperform in-state investments by 1.93 percentage points, and the difference is statistically significant with a t-statistic of 4.6. Thus, overall, out-of-state investments outperform in-state investments. Appendix Table A9 provides value-weighted versions of this analysis, with very similar results.[12]

This pattern appears particularly strongly among investments for which the LP was a public pension fund. The second set of three rows shows that for public pensions, the difference in average IRR demeaned by state and vintage is 3.75 percentage points, the difference in average IRR demeaned by state, vintage and broad investment type is 2.60 percentage points, and the difference in average IRR demeaned by state, vintage and narrow type is 2.56 percentage points. Thus, we observe a 2.5-4 percentage point underperformance of in-state investments by public pension LPs. Similar magnitudes are found in the value-weighted results in Appendix Table A9.

The panels below the top three investigate this relationship for other LP types. Whether examining net IRR demeaned by state and vintage or by state, vintage and either broad or narrow investment type, we observe no statistically significant evidence that there is any underperformance of in-state investments. While the direction of the sign is usually the same (in-state investments perform worse than out-of-state investments), the magnitudes are smaller and the t-statistics are very weak. Although not statistically significant, the level of the difference is

[12] In particular, in Appendix Table A9 we look at the underperformance of in-state investments where the means are weighted by the size of the LP commitment. For some LP types, including private pensions and private endowments the joint coverage of net IRR and LP commitment size do result in very small sample sizes.

even occasionally negative for public endowments and foundations. Aggregating across all non-public-pension categories, the mean difference is only 0.2-0.4 with t-statistics of less than 0.5.

Figure 1 shows the relative performance of public pension PE investments in-state versus out-of-state by investment type category, with a t-statistic for whether the performance is equal. Comparing within investment type category is important not only for the purposes of risk adjustment, but also because of the differences between LP types in allocation patterns across the investment types. Performance is measured as net IRR minus the mean of all other investments in the same vintage and GP state, within investment type. The figure shows that the underperformance is statistically significant within all categories. The magnitude of the underperformance is greatest for venture capital, where the difference between in-state and out-of-state investments is 3.4 percentage points. But there is clear underperformance of in-state versus out-of-state investments across all the categories.

Table 7 and Figure 1 suggest that in-state investments by public pension LPs underperform out-of-state investments. The next table examines these results in a regression context with clustered standard errors and allowing for control variables. Table 8 (Panel A) presents regression versions of the results in Table 7. The observation is an investment by a public pension LP in a PE fund. The dependent variable in the first set of columns is the net IRR minus the mean net IRR for all investments made in the same state in the same vintage year, the dependent variable in the second set of columns is the net IRR minus the mean net IRR for all investments made in the same state in the same vintage year of the same broad investment type, and the dependent variable in the third set of columns is the net IRR minus the mean net IRR for all investments made in the same state in the same vintage year of the same narrow investment type. The independent variable of primary interest is the indicator for whether the investment was an in-state investment. As we are concerned about correlated performance shocks within vintage years, we cluster our standard errors at the vintage year level. We note, however, that our reported results are robust to clustering at the LP level or clustering two-way at the LP and vintage year level.

We augment the indicator for in-state investment with a number of controls. As noted, an alternative hypothesis for the observed performance differential is that public pension fund LPs are willing to accept lower returns on home-state investments relative to out-of-state investments due to greater perceived uncertainty about the quality of investment funds or prospects in other

states. It is unclear why this argument would apply solely to public pension funds and not to other types of institutional investors. Nevertheless, if this argument is valid, one would expect that LPs would have greater uncertainty regarding the prospects of more distant states than immediately neighboring states; and thus, that we should observe LPs significantly overweighting neighboring states (relative to non-neighboring states) and achieving lower performance on their investments in neighboring states relative to their performance on investments in non-neighboring states. We therefore include an indicator variable for whether the investment in question was made by the LP in an immediately neighboring state.

We further augment the models with the excess LP in-state share, to capture whether LPs who overweight more generally are simply poor performers, and an interaction between the excess in-state share and the in-state variable, to capture whether LPs who overweight perform particularly poorly specifically on their in-state investments. The excess LP in-state share is defined as the difference between the LP's in-state share and the predicted in-state share based on the state's share of all investments that are not in-state investments (the second benchmark). We also control for the size of the LP's portfolio, in the form of the natural log of PE assets under management. In the second column of each regression set, we also add two additional controls: the investment fund size (natural log of total committed capital to the fund) and the first vintage year in which the LP became active in investing in PE (as late entry into the PE asset class may limit access to the best performing funds).

We observe broadly similar patterns across all three sets of models. In-state investments underperform out-of-state investments by 3 to 3.6 net IRR points relative to the mean state-vintage net IRR, by 1.7 to 2.3 net IRR points relative to the mean net IRR for investments within the same state-vintage-broad type, and by 1.7 to 2.1 net IRR points relative to the mean net IRR for investments within the same state-vintage-narrow type. We observe no economically or statistically significant difference between public pension fund performance on out-of-state investments made in neighboring states versus performance on those out-of-state investments made in non-neighboring states. For each 10 percentage points of excess in-state share, the net IRR is 6.9 percentage points worse when adjusting net IRR by the state-vintage mean, 4.6 percentage points worse when adjusting net IRR by the state-vintage-broad type mean, and 4.4 percentage points worse when adjusting net IRR by the state-vintage-narrow type mean. Thus, public sector pension funds who overweight in-state more also appear to be associated with

worse investment performance overall. Consistent with prior literature (Kaplan and Schoar (2005)), investments in larger PE funds perform better. Investments by public pensions who began investing later in the PE asset class exhibit slightly worse performance.

Panel B repeats the analysis in Panel A, substituting multiple of invested capital as the performance measure. While we continue to observe that investments made in-state by the public pension fund LP have lower performance, we also observe no significant relationship between the excess LP in-state share and the performance of the investment in terms of adjusted multiple of invested capital. The relationship between the size of the PE fund and performance remains positive, but the effect of later entry into the asset class is no longer significant when examining multiples of invested capital, suggesting that latecomers into the asset class may invest in funds that achieve similar multiples, but over a longer time period, leading to lower overall IRRs.

In sum, public pension funds' own-state investments perform significantly worse than their out-of-state investments, by roughly 2-4 percentage points of net IRR per year, and those that that overweight their portfolios towards home-state investments appear to perform proportionally worse on their PE investments overall. Among out-of-state investments, there is no difference between the performance of investments in neighboring states and the performance of investments in non-neighboring states.

We acknowledge that precise measures of risk for our PE fund investment sample are not available, and thus, that differences in returns may in theory be due to differences in risk profiles of investments even within type, state and vintage year. That said, there is little reason to believe that such effects would materialize only in the investments made by public pension funds.[13]

It is also possible to compare the magnitude of our findings on local private equity underperformance to the findings on local public equity outperformance in Brown et al (2011). According to data from *Pensions and Investments*, the 20 state pension funds in the Brown et al (2011) sample in 2010 had mean asset allocation to domestic equities of 31.6%, to private equity of 9.4%, and to real estate (excluding REITs) of 5.9%. Using the baseline statistic quoted in

[13] In untabulated results, we attempt to evaluate the correlation between the riskiness of the PE investments and their in- or out-of state status. Specifically, as an admittedly crude proxy, we calculate the within GP standard deviation of returns (net of state--vintage--type mean) across funds (for GPs who have raised at least 3 funds). We assign this GP-level risk measure to each investment made in a fund raised by that GP, and compute the correlation between the riskiness of each investment and its in- or out-of-state status. We find a negligible (-0.0018) correlation between the measure of riskiness of the investment and whether the investment is located in-state or out-of-state. We thank Jules von Binsbergen for this suggestion.

Brown et al (2011), by which 95% of the US domestic equities for these pension systems are actively managed in-house, an allocation of 3.7% to local public equities investments in the largest local industry (the only sector in their sample that shows outperformance), and a local public equities outperformance of 336 basis points per year in the state's largest industry, local overweighting of public equities provides an additional 3.73 basis points (=0.95*0.316*0.037*336) a year for these 20 pension funds on the full pension fund assets. Using our baseline in-state share of 16.2% for public pensions and local PE underperformance of 256 basis points per year (net of state-vintage-narrow type mean) for public pensions, local overweighting of private equity leads to a penalty of 6.34 basis points (= 0.1530*0.162*256) per year on the full pension fund assets for the average pension fund with mean allocations as in the Brown et al sample. The 6.34 basis points is the cost of the overweighting piece of the public pension fund PE portfolio alone; if we were to instead measure the cost versus the entire allocation to in-state investments, this penalty would rise to 9.7 basis points per year on the full pension fund assets. Thus, our findings are not to suggest that local overweighting is inherently tied to underperformance in all asset classes, but rather suggest that local investment biases in different asset classes should be considered separately.

3. Why Do Public Pension LPs Overweight Local Investments?

Why do public pension funds overweight home-state investments with poor performance? One natural explanation for local overweighting would be a "superior access" story. Under this hypothesis, public pension funds enjoy superior access to funds located in their states, due to local networks or connections. Thus, local public pension funds have a broader set of investment opportunities within their state than out-of-state investors, and are thus able to obtain allocations in the best local funds. Under this sort of access story, public pension funds would then cherry pick the best in-state investments available, due to their superior access, and should thus enjoy returns on their home-state investments that are higher than the returns obtained in their home-state by out-of-state investors. As we saw in the previous section, however, public pension funds, in actuality, perform worse on investments in their home-state than out-of-state investors investing in that same state. This suggests that an access story of this sort cannot explain the home-state overweighting.

The implications of a "superior information" hypothesis, whereby public pension funds

have superior information about home-state investments (again due to local networks or connections, or due to superior local knowledge) are similar to those of the superior access story. Thus, the underperformance results we observe in the previous section suggest that an information story of this sort is also unlikely to be the root cause of home-state overweighting by public pension funds.

An alternative, "rationed access," story for overweighting would suggest that public pension funds overweight home-state investments due to rationing by out-of-state PE funds, i.e. because top performing funds in other states that are under high investor demand either refuse allocations to out-of-state investors or limit their ability to invest. This type of rationing story, however, would predict that public pension funds would have poorer performance on their out-of-state investments (where they are rationed from the best funds) than on their in-state investments; however, as is clear from the previous section, we observe *higher* out-of-state performance for public pension funds, inconsistent with such a rationing hypothesis.

A separate rationing hypothesis focuses particularly on the public status of public pension funds, and hypothesizes that public pension funds are rationed from the best performing funds more generally, due to concerns regarding their susceptibility to Freedom of Information Act (FOIA) requests or state-level disclosure rules. The FOIA-rationing story, however, does not have clear geographic implications that would explain home-state overweighting, as this concern should apply universally regardless of the state the investment is located in. Furthermore, it is unclear why similar FOIA-related concerns would not lead to equivalent rationing of public endowments, yet the results in the previous two sections suggest that we do not observe the same scale of over-weighting for public endowments; nor do we observe any significant performance differences between in-state and out-of-state investments for public endowments.

Alternatively, it is possible that the home-state over-weighting patterns we observed stem from uncertainty aversion due to distance or lack of familiarity (Epstein and Miao (2003)). To generate our results, such uncertainty aversion or familiarity bias would have to apply solely (or more strongly) to public pension fund managers than to other types of LPs. Moreover, as noted in the prior sections of analysis, we observe no significant overweighting of investments in immediately neighboring states relative to non-neighboring states, and we observe no difference in performance between out-of-state investments made by public pension fund LPs in immediately neighboring states and those made in non-neighboring states, making this an

unlikely explanation for our findings.[14]

Why then do public pension funds overweight home-state investments with poor performance? In Table 9, we empirically explore the relationship between home-state overweighting and proxies for a number of possible drivers of such behavior.

First, home-state investments are often justified in the context of Economically Targeted Investment (ETI) programs. If there is political pressure to invest in local PE projects and the supply of such projects is limited, then public pension systems may invest in poorly performing local funds. These political pressures may be higher in states where self-dealing, corruption and quid pro quo activity is more commonplace. As proxies for political pressure, we employ the measures of state-level corruption and examine whether they correlate with the public pension fund LP's decision to overweight local investments.

State governance measures such as corruption, however, are correlated with other state characteristics. For example, according to Glaeser and Saks (2003), state-level corruption is higher in less-educated and poorer states, but it is unrelated to the size of state government. Thus, the GS corruption measures may also capture elements related to the sophistication of the managers of the state's public pension funds, and suggests a second hypothesis which is that the local overweighting is the result of narrow talent pools for LP fund managers. As public pension funds are thought to offer compensation levels that are significantly lower than the norm in the financial services industry, they may have to recruit investment managers from a limited, local talent pool, as opposed to the competitive global talent pool in which private institutions compete.[15] We attempt to separate these effects from political pressures by including the fraction of the state population over 25 that holds a bachelor's degree or higher, as well as state-level economic performance in the form of Gross State Product (GSP) and GSP growth. Both the general education level of the state populace as well as state economic conditions may proxy for the depth and quality of the managerial pool available to local public pensions.

[14] The lack of similar overweighting and underperformance patterns for neighboring states also casts doubt on travel-cost related explanations for home-state over-weighting, as the costs (in time and dollars) of travel to immediately neighboring states should be lower than to non-neighboring states. Furthermore, in the PE industry, it is typically the GPs of the PE funds who travel to raise capital and report to LPs, not the LPs traveling to the GPs to seek investment allocations.

[15] Unfortunately, compensation levels, and more importantly, compensation structures (salary, bonus, incentives) for public pension fund managers are not typically made publicly available, and so we cannot control directly for differences in pay-for-performance incentives.

A third, related, hypothesis is that the home-state investing is simply a function of mismanagement or general investing skill. As such, we employ a few proxies for the likely quality of management. As in Table 6, we control for the log of the size of the PE portfolio as well as the year in which the LP made its first investment in PE. We also include the extent to which the public pension fund is underfunded. While it is unclear why underfunding would be related directly to taking additional local exposure, if underfunding is a symptom of general mismanagement or poor investing skill, a consequence may be both poor choices of investments and/or susceptibility to local political pressures to invest in-state.

A fourth hypothesis is that the home-state investment reflects something about public pension fund board characteristics instead of state-level governance. To proxy for governance quality, we include the ratio of political appointees and ex officio members to total members on the pension fund investment board. Note that every public pension fund LP in our sample has at least one board member appointed by the state governor. As further proxies for the types interests reflected on the board, we include indicator variables for whether the board represents teachers and public safety officials.

Table 9 presents the estimates from our regression models. The dependent variable is the excess share of in-state investments for public pension funds. All models include vintage year fixed effects. Standard errors are conservatively clustered by the state of the LP, to account for potential serial correlation not only in the investment decisions of any particular pension fund but also for potential serial correlation in the investment decisions of all public pension fund LPs in the state. Column (1) relates the excess share of in-state investments to the GS corruption rate; column (2) substitutes the BL measures and non-response indicator, and column (3) includes both the GS and BL measures and non-response indicator. Columns (4) and (5) then augment the base model in column (1) with the additional variables of interest described above.

Looking at the results, it is clear that for public pension funds, higher state-level corruption is positively correlated with the excess share of in-state investments. The coefficient on the corruption index is significant in all models, both economically and statistically: a one standard-deviation increase in the corruption index (0.14) implies an increase in the excess share of in-state investments of 8-9 percentage points. When we include only the BL survey measures, both BL survey and the non-response indicator enter significantly. When both the GS index and the BL measures are included, the GS measure is significant at the 1% level; the BL survey non-

response indicator remains statistically significant but not the BL index itself. The explanatory power of the models appears to be moderate, with the R^2 of the most comprehensive regression model (column (5)) at 0.17, a large part of which comes from the corruption measures. These results are consistent with recent allegations of pay-to-play schemes involving political pressure on public pension fund managers in states including Illinois and New York.

Among the additional independent variables of interest, we observe no significant correlation between overweighting and education, population, the size of the LP's PE portfolio, the first year of investment in PE, the indicators for teachers and public safety pension funds or the board capture ratio. Public pension LPs located in states with higher GSP (larger economies) appear to do less home-state overweighting, although overweighting does not appear to be significantly related to growth in state GSP. Public pension LP's with higher funding ratios are also associated with lower home-state overweighting, consistent with the notion that local overweighting may also be related to general mismanagement of the pension fund. The fact that overweighting does not appear to be significantly related to LP PE portfolio size suggests that rationing type stories are not likely to be the drivers of local overweighting behavior, as larger LPs are generally believed to enjoy greater access to allocations.

Table 10 presents estimates of similar models for excess share of in-state investments, separately estimated for the different LP types, and employing only those independent variables from Table 9 that are available for all LP types. The estimates suggest that very different forces are at play for other types of institutional investors. As in Table 9, in column (1), we observe that corruption, as a proxy for political pressures, is positively and significantly related to the excess share of in-state investments for public pensions. In contrast, we observe no significant relationship between state-level corruption and home-state overweighting for public endowments (positive but insignificant coefficient), private pensions (positive but insignificant coefficient) or foundations (negative and insignificant coefficient). For private endowments, state-level corruption is significantly *negatively* related to the excess share of in-state investment.

How then does corruption, our proxy for potential state-level political pressures to invest in state, relate to the performance of in-state investments? In particular, do in-state investments perform as poorly in less corrupt states as in more corrupt states? We note that even if there is no correlation between corruption and performance on in-state investments, the fact that in-state investments underperform across the board and that more corrupt states do more in-state

investing are by themselves consistent with political pressures affecting state geographical investment choices. To see this, consider the very simplified example where all LPs are captured by politicians and have access to two types of investments: investments with a 10% IRR and no private benefits for politicians, and investments with an 8% IRR and significant private benefits for *in-state* politicians that lead them to prefer the lower returning investment when investing in-state. Suppose that in more corrupt states, politicians taking in-state investments to collect private benefits are less likely to be detected and punished. In that case, one would find that in more corrupt states, the LPs invest more of the portfolio in in-state investments due to self-dealing. One would also find, however, that the IRR of *in-state* investments was no worse in the more corrupt states than the less corrupt states (8% in each). To observe that corruption actually correlated with the average performance of in-state investments would require the 8% IRR in the above example be lower in corrupt states and higher in less corrupt states, which is not a necessary condition for corruption to be the key driver of the in-state versus out-of-state decision.[16]

To see whether in-state performance is even worse for more corrupt states than for less corrupt states, in Table 11 we regress the performance of an investment on an indicator variable for whether it is an in-state investment, the corruption index, the size the LP's PE portfolio, the education level in the state (as a proxy for the managerial talent pool) and the year the LP first began investing in PE. We are specifically interested in understanding not only whether investments in more corrupt or less educated states (for example) have lower performance, but more particularly whether *in-state* investments in such states are lower-performing. We therefore augment our models with interactions of such variables with the in-state indicator.

In columns (1) and (2), we isolate our models to investments made by public pension funds; in columns (3) and (4) we isolate to investments made only by other types of LPs. In Panel A, the dependent performance variable is the net IRR minus the vintage year mean net IRR for investments in that state and of that the (broad) investment type; in Panel B, it is the multiple of invested capital minus the vintage year mean multiple for investments in that state and

[16] Alternatively, one could imagine three types of investments: "good" out-of-state investments, "good" in-state investments, and "bad" in-state investments. Assuming that both types of in-state investments increase with corruption, the overall correlation between corruption and in-state returns will depend on how corruption correlates with the returns on each type of in-state investment. For example, one might still find no overall correlation between corruption and in-state returns (or even a positive correlation) if the good in-state investments happen to be better in corrupt states, and the bad in-state investments are equally bad or worse.

(broad) investment type.[17]

Looking at the public pension columns of both Panels A and B, we see no significant relationship between corruption and the performance of in-state investments. The coefficients on the interaction terms are positive and insignificant. Furthermore, public pension LP investments in more educated states in fact perform slightly worse, with a one standard-deviation increase in education correlated with lower performance by 70 basis points of net IRR, suggesting that education levels in the state may have little to do with the talent pool from which the pension fund can draw. In-state investments in PE funds located in higher-education states perform even worse; a one standard-deviation increase in education is correlated with 120 basis points lower net IRR. This is the opposite of what one would expect if public pension funds draw from an even less talented pool in states that do substantial amounts of in-state investing.[18]

Looking at the models for the performance of investments by other LP types (the second set of columns) we see no statistical significance on any of the interaction terms. Consistent with the estimates in Table 8, LPs of any type who entered the PE asset class later have worse performing investments.

Other than the interaction between education and the in-state indicator, we see no other significant coefficients on the interaction terms, and the R^2s for the models are weak (0.00-0.01), leading us to conclude that the available data does not allow us to explain cross-sectional variation in public pension funds' in-state underperformance. We observe somewhat similar though even weaker patterns when looking at models in Panel B where the dependent variable is the demeaned multiple of invested capital. As in Table 8, the significance of the coefficient on the year the LP entered PE investing disappears in the models for MIC. No other variables show a statistically significant relationship to performance, and the models' explanatory power is low.

In sum, there is clear evidence that public pension funds overweight in-state investments in more corrupt states to a greater degree than in less corrupt states, which is suggestive of a political role in the geography of public pension fund investments. There is no evidence that the

[17] In a prior version of the paper, the dependent variable in this table was the net IRR (net multiple of invested capital) minus the vintage year mean net IRR for investments in that state, and was not adjusted for investment type. Since particular types of investments are concentrated in certain states, and these concentrations are correlated with state-level corruption, excluding the type resulted in somewhat different estimates than are obtained when appropriately demeaning by type as well.

[18] To see this, one need only note that Massachusetts has the highest education levels in the sample but also very substantial performance differentials between in-state and out-of-state investments.

underperformance on in-state investments is any worse for more corrupt states than for less corrupt states: the extent of underperformance per in-state investment is statistically indistinguishable between more corrupt and less corrupt states, although the more corrupt states are investing a larger fraction of their PE portfolios in these underperforming in-state funds. There is relatively little evidence for the other hypotheses we consider, although states with larger economies and better funding ratios also overweight in-state investments to a lesser extent.

A scenario that would be consistent with these findings is one where public pension funds faced a hard requirement to allocate a specific percentage of their overall assets to the PE asset class, are rationed from the best funds in all states, but are able through local networks to gain allocations in poor funds in-state that are otherwise unattractive to investors.[19] These local investments may have been created specifically in order to benefit from this type of situation through political influence.

4. Cost of In-State Overweighting & Underperformance by Public Funds

We now examine how much in-state overweighting and underperformance costs the state public pension systems. Table 12 presents home-state weighting and performance statistics for public pension funds. The first column shows the public pension LPs' in-state share and the second shows the state's five-year rolling share of investments by out-of-state LPs. As an example, consider the state of Massachusetts, one of the highest overweighting states in the sample. While the behavior of out-of-state LPs would suggest that Massachusetts PE funds should receive an 18.5% weighting, in fact 45% (=18.5% + 26.5%) of Massachusetts public pension investments in PE are in Massachusetts.

The middle panel of Table 12 then shows the average differential between the investment's net IRR and the average net IRR of other investments of the same vintage and investment type (buyout, venture, real estate, or other), for three geographical classifications of investments: (i) LP and GP both in the state; (ii) LP not in the state, GP in the state; (iii) LP in the state, GP not in the state. Keeping with our example, Massachusetts, we see that (i) the average net IRR for public pension investments where both the LP and GP are in Massachusetts is -7.61 percentage points relative to the average investment of the same type and same vintage;

[19] The hard requirement to allocate a specific percentage of assets to PE would have to be imposed regardless of the access the LPs had to better quality funds.

(ii) the average net IRR when non-Massachusetts public pension LPs invest in Massachusetts is 1.96 percentage points more than other investments of the same type and vintage; and (iii) the average net IRR when Massachusetts public pension LPs invest outside of Massachusetts is 1.53 percentage points more than other investments of the same type and vintage.

Across all states, Table 12 shows that the in-state private equity investments by public pension LPs return 5.1 percentage points less than investments by out-of-state LPs in the same state, vintage, and type. Furthermore, these investments return 6.5 percentage points less than out-of-state investments of the same vintage and type by the same LPs. Weighting by the size of the private equity program within each state, public pension fund performance on in-state investments is worse by 3.4 percentage points compared to investments of the same vintage and type made by out-of-state LPs into the public pension fund's home state, and by 5.2 percentage points relative to investments of the same vintage and type that those same LPs make out of state. By calculating net IRRs relative to the mean of other investments of the same vintage and type, our calculations do not reflect any positive or negative returns from market timing that the public pension LPs might be achieving, nor do they reflect any positive or negative returns from the selection of investment types among the broad alternative asset classes.

Table 13 shows the financial effects of overweighting and underperformance for public pension funds based on the calculations Table 12. The left panel uses the investments by out-of-state LPs in the state as a benchmark, and the right panel uses the investments by in-state LPs outside of the state as a benchmark. The first column is therefore the IRR difference between home-state investments and investments by out-of-state LPs in the state, times the predicted in-state share, times the size of the PE program. So for example, as can be seen in Table 12, the investments of California LPs in California underperform by 2.76 percentage points (= – 0.34 – 2.42) relative to the investments of non-California LPs into California. The predicted share for California is shown in the same table as 23.7%, based on the state's five-year rolling share of all investments by out-of-state LPs. And California LPs had PE programs totaling $56.9 billion. So the underperformance of in-state investments would cost California $372 million (= 2.76% * 23.7% * $56.9 billion) per year if there were no overweighting.

The second column of Table 13 shows the loss from underperforming on the excess share. In the case of California, the excess allocation to state PE is 9.1%, so the cost due to underperformance on the excess portion is $142 million (= 2.76% * 9.1% * $56.9 billion) per

year. The third column is the sum of the first two columns and reflects the total cost due to overweighting and underperformance.

The drawbacks of calculating costs using LP(in)GP(in) – LP(out)GP(in) as in left panel of Table 13 are twofold. First, consider a state such as Pennsylvania. Pennsylvania LPs actually did better investing in their state than others did investing in Pennsylvania, though Table 12 reveals that both groups did poorly investing there. The left panel of Table 13 is crediting Pennsylvania for having performed less poorly in a state with poorly performing PE, ignoring the fact that they could have done much better by investing out-of-state. Second, states that do more overweighting were found in Table 9 to have worse performance on average, so the left panel may reflect overall poorer investing by states with a large excess share in the home state.

The right panel of Table 13 addresses these issues by considering the differential between LP(in)GP(in) and LP(in)GP(out). That is, costs are calculated relative to how the LP performed on its own out-of-state investments. For a state such as California, this dramatically reduces the costs relative to the left panel, as California did not perform much worse on in-state investments than on out-of-state investments. For Pennsylvania, on the other hand, the fact that they performed worse so much worse in PA than out of PA is now accounted for as a cost. The drawback of the right panel, however, is that it does not reflect an investor's relative ability to pick in-state investments. New York LPs, for example, did better investing in New York than out of New York. The right panel credits them for that. So if the benchmark is how New York public pension funds perform out-of-state, New York appears to do better keeping its investments at home, even though it performs considerably worse on home-state investments than out-of-state public pension LPs perform when investing in New York.

The bottom line of Table 13 is that if each public pension LP had performed as well on its in-state investments as out-of-state public pension LPs performed on investments in the same state, the public pension LPs would have reaped $1.25 billion annually in additional returns. If each public pension LP were to have performed as well on its in-state investments as it did out of state, then the total annual benefit would be $1.28 billion. While some states appear better on one measure or the other, the aggregates are very close.

A rather substantial share of these costs (on an aggregate dollar basis) comes from a small number of states. California and Massachusetts comprise over $0.75 billion of the $1.25 billion annual cost in the left panel, with Ohio and North Carolina being the other states that

contribute over $0.1 billion and around half of the states not showing any underperformance relative to what out-of-state LPs are able to achieve in the state. In the right panel, the costs are somewhat more evenly distributed, with Pennsylvania, Ohio, North Carolina, Massachusetts, and Illinois all contributing over $0.1 billion per year to the annual cost and around two-thirds of the states showing some costs from underperformance.

Despite the concentration of aggregate dollar costs in several states, a number of states nonetheless incur costs from investing that are a non-trivial share of either PE assets under management or of annual contributions to the state's public pension funds. Figure 2 shows these total financial effects based on the left panel of Table 13, that is LP(in)GP(in) – LP(out)GP(in). Here, Massachusetts loses over 10% of annual pension contributions per year, and over 4% of PE program assets per year, to in-state overweighting and underperformance. California loses around 3.5% of contributions, which amounts to around 1% of PE program assets per year, and Ohio loses 3.1% of contributions, which amounts to around 2.5% of PE program assets per year. As explained above, Pennsylvania is the one state whose LPs performed considerably better on their in-state investments than out-of-state investors did. Figure 3 shows the analogous analysis for the right panel of Table 13, that is LP(in)GP(in) – LP(in)GP(out). On this measure, Pennsylvania loses the largest share of its annual contributions (17%), in part because such contributions are small but also because they outperformed out-of-state very substantially relative to when they invested in Pennsylvania.

On the face of it, the measure in Figure 3 (LP(in)GP(in) – LP(in)GP(out)) may seem more compelling. Public pensions systems incurring high costs on this measure would have done better if they could have achieved their out-of-state returns on the funds they invested in-state. However, as a measure of an LP's quality as an investor in that particular state as opposed to as an overall investor, the performance of out-of-state LPs investing in the state cannot be irrelevant. Figure 2 is therefore more representative of the LP's ability to invest in a given state.

A caveat to the cost analysis presented here is that, given the incomplete data on actual dollar value allocations to funds, we must necessarily make some assumptions about the relative portion of the portfolio dedicated to any individual fund in our sample. For the purpose of providing a cost estimate, the calculations in these tables assume that all fund investments are of equal size. As an alternative, we have performed value-weighted cost analysis using only the investments for which commitment levels are available, and then extrapolating to the rest of the

PE portfolio. In untabulated results, we find that the calculations are highly robust to considering the relative size of investments in this way. On a value-weighted basis, the aggregate total costs are $1.29 billion on the (LP(in)GP(in) – LP(out)GP(in)) measure, and $1.10 billion on the (LP(in)GP(in) – LP(in)GP(out)) measure. For most public pension funds there are commitment data on 80-90% of the in-state investments for which net IRR is also available. But some states, such as New York, hardly disclose commitment levels at all. In New York in particular, the commitment data are only disclosed on around 14% of the in-state investments for which net IRR is also available, and those investments performed much more poorly than the average New York investment for which the commitment is not available.

Given that the selection in disclosure of commitment levels seems to favor worse-performing investments, we believe that the equal-weighted analysis provides a more accurate picture of the costs for comparison across states. Given the overall similarity of the picture using the value-weighted analysis, it is clear that the equal-weighted results are not being driven by small investments and are robust to considerations of investment size.

5. Conclusion

Investment biases by individual investors have attracted much scrutiny. Knowledge of the biases and tendencies of institutional investors, in contrast, is more limited. In this paper, we examine the allocations and investment choices of institutional investors in the PE market and explore their tendencies to invest in their own state.

In contrast to the literature on home bias in mutual funds, our findings that public pension LPs underperform on local investments show that in the setting of PE investments by local public pension LPs, any informational advantages are overwhelmed by factors that induce local public pension LPs to select investments that perform worse. Our results suggest that the home-state overweighting by public pensions may be related to measures of state-level corruption, and that political pressures or dealing may be related to the tendency to invest disproportionate amounts in local funds. Further exploration of the governance channel is thus warranted.

We note that our analysis does not necessarily suggest that public pension funds would have been better off diverting funds outside the PE asset class. During the sample period, PE investments outperformed the public equity markets (Robinson and Sensoy (2011)). The PE

asset class is of some importance in generating excess returns for pension funds, particularly for large funds (Dyck and Pomorski (2011)), and it is possible that investing even in an underperforming PE portfolio may have been more profitable over our sample period than shifting those funds to public equities. Furthermore, our work is not to suggest that local overweighting is inherently tied to underperformance in all asset classes, as Brown et al (2011) find an outperformance in some segments of local public equities. This suggests that local investment biases in different asset classes should be considered separately.

These findings can potentially shed light on some of the previously documented puzzles in the private equity market (see, e.g., Lerner, Schoar and Wongsunwai (2007)). Our work also opens interesting questions and avenues for future research. First and foremost, we have not assessed the overall welfare impact of the home bias behavior we document for public pension funds. Further research that analyzes the extent of any potentially positive effects of local private equity investments on overall welfare would be useful. A second question is whether the patterns we document for private equity investments also generalize to other unexplored categories of investment, such as hedge funds, real assets, and outside public equity managers. Finally, future research should aim to develop a greater understanding of the overall role of private equity investments in the portfolios of different types of institutional investors.

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Table 1
Number of Investments by Source and Type

Investments by Source	Investments	Share
Preqin Only	10,789	57%
VE/V1 Only	380	2%
Capital IQ Only	1,024	5%
Preqin and VE/V1	2,159	11%
Preqin and Capital IQ	2,393	13%
VE/V1 and Capital IQ	806	4%
Preqin, VE/V1, and Capital IQ	1,277	7%
Total	18,828	100%

Investments by Type		Investments	Share
Buyout		5,682	30%
Venture Capital		5,562	30%
General	3,329		
Early Stage	1,805		
Late Stage	373		
Venture Debt	55		
Real Estate		2,489	13%
Other		5,095	27%
Fund of Funds	1,508		
Distressed Debt	1,000		
Mezzanine	630		
Natural Resources	579		
Balanced	422		
Secondaries	320		
Expansion	195		
Infrastructure	153		
Other	288		
Total		18,828	100%

Table 2

Summary Statistics

Panel A shows summary statistics for the key performance measures, net IRR and multiple of invested capital, by LP type and investment type, for the subsamples of the 18,828 total investments for which these performance-related date items are available. Panel B shows the distribution of vintages by decade and LP type. Panel C shows summary statistics on the size of the PE portfolios of the 691 unique LPs in 2009, the size of each of the 3,553 unique PE investment funds for which the total size is available, and the size of the commitments for the 10,833 of the 18,828 total investments for which the commitment size is available. Panel D tabulates some explanatory variables. WY is excluded from state variables because there are no WY LPs in the sample; DC is excluded from the state corruption variables because it was not included in the corruption studies. The corruption index is from Glaeser and Saks (2006). The Corruption BL Survey is based on Boylan and Long as reported in the New York Times by Marsh (2008). The BL Non-Response variable is a corruption indicator for whether no state house reporters responded to the corruption survey. % College is the percentage of state residents over 25 with Bachelor's Degree, from the U.S. Census. Gross State Product data are from the BEA. The funding ratio is the ratio of assets to liabilities as of the 2008 actuarial valuations of the public pension systems. Teachers is an indicator for whether the pension system represents at least some teachers, and Public Safety is an indicator for whether the pension system represents at least some public safety officials. The Board Capture Ratio is the ratio of political appointees and ex officio members to total members on the investment board.

	Panel A: Performance			
	Mean	Median	Std Dev	N
Net IRR by LP Type				
Endowment	12.01	6.10	35.73	2,268
Foundation	9.78	6.30	29.30	2,126
Private Sector Pension Fund	8.41	6.45	24.50	910
Public Sector Pension Fund	5.78	5.00	29.33	9,577
Net IRR by Investment Type				
Buyout	7.42	8.30	19.30	4,871
Venture	11.54	2.00	42.89	4,422
Real Estate	-7.27	-0.90	26.46	1,658
Other	9.15	8.40	22.78	3,930
Net IRR All	7.46	5.40	30.22	14,881
Multiple by LP Type				
Endowment	1.79	1.18	2.90	2,532
Foundation	1.66	1.19	2.80	2,371
Private Sector Pension Fund	1.57	1.25	1.93	978
Public Sector Pension Fund	1.36	1.09	1.44	11,091
Multiple by Investment Type				
Buyout	1.41	1.24	0.87	5,312
Venture	1.93	1.04	3.51	4,709
Real Estate	0.96	0.88	0.56	2,282
Other	1.34	1.17	0.72	4,699
Multiple All	1.47	1.13	1.99	16,972

	Panel B: Vintage			
	1969-1979	1980-1989	1990-1999	2000-2010
by LP Type				
Endowment	2	95	1,017	1,844
Foundation	0	63	826	2,064
Private Sector Pension Fund	0	75	420	608
Public Sector Pension Fund	7	493	3,256	8,041
by Investment Type				
Buyout	1	166	1,835	3,680
Venture	8	419	2,084	3,042
Real Estate	0	60	396	2,033
Other	0	81	1,204	3,802
Total	9	726	5,519	12,557

	Panel C: Size			
	Mean	Median	Std Dev	N
Size of LP Portfolio (LP level, $M)				
Endowment	281	81	649	168
Foundation	153	33	564	193
Private Sector Pension Fund	1,186	317	2,595	84
Public Sector Pension Fund	1,176	158	3,054	186
Total	626	89	2,017	631
Size of Investment Fund (PE Fund Level, $M)				
Buyout	1,228	500	2,257	771
Venture	265	170	308	1,028
Real Estate	727	450	1,008	472
Other	782	400	1,253	890
Total	715	313	1413	3,161
Size of Commitment (Investment Level, $M)				
Endowment	14.9	10.0	19.3	984
Foundation	6.32	3.0	19.3	131
Private Sector Pension Fund	232.8	40.0	363.2	13
Public Sector Pension Fund	49.3	25.0	87.0	9,705
Total	45.9	20.0	84.1	10,833

	Panel D: Explanatory Variables			
	Mean	Median	Std Dev	N
State Level (State of LP)				
Corruption Index (Glaeser-Saks)	0.28	0.25	0.14	49
Corruption Survey (Boylan-Long)	3.28	3.50	1.39	49
Survey Non-Response	0.06	0.00	0.24	49
State x Year Level				
Population	6,573,182	4,686,737	6,633,027	983
Ln(Population)	15.23	15.36	1.03	983
Gross State Product (GSP), $T	0.21	0.13	0.25	984
Ln(GSP)	-2.10	-2.03	1.06	984
GSP Growth, Nominal	0.057	0.058	0.034	984
Education (% over 25 with a Bachelors Degree)	21.7	21.4	5.0	984
LP Level				
Earliest Vintage Investment	1996	1998	8.00	631
Public Sector LP Characteristics				
Teachers Indicator	0.22	0.00	0.41	186
Public Safety Indicator	0.34	0.00	0.47	186
Board Capture Ratio	0.55	0.55	0.25	177
Funding Ratio (2008)	0.76	0.77	0.17	129

Table 3

Overweighting by LPs of In-State Investments, Rolling 5-Year Benchmarks

The table presents the equal-weighted and valued-weighted home-state bias of the portfolios of LPs located in each state using rolling 5-year benchmarks. Column (1) is the number of [LP x vintage] observations in which PE investments were made, which constitutes the number of observations used in the equal-weighted calculation. Column (2) presents the overweighting relative to all investments, calculated as the average percent of in-state investments minus the state's share of all investments by all LPs in the full sample over the preceding five years. Column (3) presents the overweighting relative to all out-of-state investments, calculated as the mean over the sample period of the percent of in-state investments in each year minus the state's share of all investments by out-of-state LPs in the full sample over the preceding five years. Column (4) is the number of [LP x vintage] observations used in the value-weighted calculation, which is the subset of column (1) for which commitment data are available. Columns (5) and (6) repeat the exercises in columns (2) and (3), value-weighting the investments by the dollar value of capital committed to the fund by the LP, and including only investments for which the capital committed by the LP is known. WY has no LPs in our sample. Nine states without PE investments are not shown: AK, HI, KS, MS, MT, ND, NV, SD, and WV. For three states (AL, AR, and NM), we have no investments with known commitment amount data.

	Equal Weighted			Value Weighted		
	Observation Count	Home Bias, % of Portfolio, Relative to		Observation Count	Home Bias, % of Portfolio, Relative to	
	LP x Vintage	All LPs	Out-of-State LPs	LP x Vintage	All LPs	Out-of-State LPs
State (LP)	(1)	(2)	(3)	(4)	(5)	(6)
AL	2	0.0%	0.0%			
AR	12	4.8%	4.8%			
AZ	30	1.8%	1.8%	21	5.7%	5.7%
CA	548	13.2%	15.2%	339	13.5%	18.5%
CO	124	10.3%	10.4%	88	8.9%	9.1%
CT	97	3.5%	2.2%	34	14.1%	13.9%
DC	63	0.5%	0.2%	5	1.6%	1.2%
DE	18	0.0%	0.0%	10	0.0%	0.0%
FL	53	0.6%	0.5%	23	-0.1%	-0.1%
GA	52	2.2%	2.2%	6	-0.1%	-0.1%
IA	53	1.5%	1.6%	39	0.4%	0.4%
ID	26	2.3%	2.3%	26	0.6%	0.6%
IL	322	22.3%	22.7%	171	24.3%	24.5%
IN	83	9.8%	9.9%	38	4.2%	4.2%
KY	37	7.6%	7.6%	31	8.0%	8.0%
LA	47	3.6%	3.6%	39	2.9%	2.9%
MA	394	31.7%	31.0%	143	36.1%	35.0%
MD	106	3.4%	3.3%	48	4.6%	4.5%
ME	19	0.0%	0.0%	3	0.0%	0.0%
MI	213	1.0%	1.0%	78	0.1%	0.1%
MN	126	13.3%	13.5%	53	8.3%	8.3%
MO	96	4.3%	4.4%	41	1.2%	1.2%
NC	95	10.6%	10.7%	28	4.3%	4.3%
NE	20	4.3%	4.4%	14	18.1%	18.1%
NH	35	1.6%	1.6%	22	2.2%	2.2%
NJ	52	2.7%	2.5%	15	-0.3%	-0.4%
NM	19	7.9%	7.9%			
NY	553	5.2%	3.8%	61	-1.2%	-5.6%
OH	180	32.4%	33.1%	127	32.4%	32.9%

OK	24	-0.1%	-0.2%	14	0.0%	-0.1%
OR	66	3.1%	3.1%	41	5.6%	5.6%
PA	219	16.0%	16.7%	76	27.5%	28.3%
RI	35	12.3%	12.2%	20	11.4%	11.3%
SC	12	0.9%	0.9%	5	0.6%	0.6%
TN	30	18.9%	18.9%	5	0.0%	0.0%
TX	236	13.1%	13.0%	163	14.1%	14.3%
UT	25	6.7%	6.7%	7	16.8%	16.8%
VA	72	0.2%	0.1%	34	1.3%	1.3%
VT	21	-0.1%	-0.1%	15	0.0%	-0.1%
WA	113	4.0 %	4.1%	60	4.9%	5.1%
WI	98	4.0%	4.1%	54	0.7%	0.7%

Table 4

In-State Overweighting Overall and by LP Type

The table presents overweighting of in-state investments, overall and by LP type, where the LP's in-state overweighting each year is calculated versus benchmarks based on the prior five years of investments. The unit of observation in the top panel is the investment, and in the bottom panel it is the LP-year. The first row of each panel shows statistics for the in-state investment indicator over all observations. The second row shows statistics for the observations for which funds exist in the state of the LP. *** significant at the 1% level, ** significant at the 5% level, * significant at the 10% level.

		In-State Investments		Excess over Baseline 1: Share of Investments in State by All LPs		Excess over Baseline 2: Share of Investments in State by Out-of-State LPs		Difference with Public Pension
Sample	N	mean	std err	mean	std err	mean	std err	
At Investment Level								
All	18,828	0.167	0.003					
All in States with PE	18,102	0.174	0.003	0.078	0.003***	0.081	0.003***	
By LP Type								
Public Sector Pension	11,174	0.194	0.004	0.092	0.004***	0.097	0.004***	
Private Sector Pension	1,105	0.176	0.011	0.065	0.011***	0.062	0.011***	-0.036**
Endowment	2,933	0.129	0.006	0.067	0.006***	0.067	0.006***	-0.030***
Public Institution	1,410	0.080	0.007	0.062	0.007***	0.063	0.007***	-0.034***
Private Institution	1,523	0.174	0.010	0.072	0.009***	0.070	0.009***	-0.027**
Foundation	2,890	0.140	0.006	0.037	0.006***	0.038	0.006***	-0.060***
At LP-Vintage Level								
All	4,589	0.199	0.004					
States with PE	4,426	0.207	0.004	0.117	0.004***	0.118	0.004***	
By LP Type								
Public Sector Pension	1,943	0.249	0.007	0.160	0.006***	0.162	0.006***	
Private Sector Pension	445	0.176	0.013	0.075	0.011***	0.071	0.011***	-0.092***
Endowment	995	0.150	0.008	0.080	0.007***	0.080	0.007***	-0.082***
Public Institution	400	0.094	0.009	0.077	0.008***	0.079	0.008***	-0.084***
Private Institution	595	0.187	0.012	0.082	0.011***	0.081	0.011***	-0.081***
Foundation	1,043	0.195	0.009	0.092	0.009***	0.093	0.009***	-0.069***
Weighted by Commitment								
All in State with PE	2,013	0.195	0.006	0.131	0.006***	0.138	0.006***	
Public Pension	1,638	0.205	0.007	0.139	0.007***	0.148	0.007***	
Non Public Pension	375	0.149	0.014	0.096	0.012***	0.098	0.012***	-0.050***

Table 5

In-State Overweighting by Investment Type and Time Period

The table presents overweighting of in-state investments, overall and by investment type, where the in-state overweighting each year is calculated versus benchmarks based on the prior five years of investments. The unit of observation in the top panel is the LP-vintage. *** significant at the 1% level, ** significant at the 5% level, * significant at the 10% level.

		In-State Investments		Excess over Baseline 1: Share of Investments in State by All LPs		Excess over Baseline 2: Share of Investments in State by Out-of-State LPs		Difference with Public Pension
Sample	N	mean	std err	mean	std err	mean	std err	
By LP-Vintage								
Buyout	1,988	0.174	0.006	0.069	0.005***	0.071	0.005***	
Public Pension	964	0.168	0.008	0.082	0.007***	0.085	0.007***	
Private Pension	204	0.223	0.023	0.061	0.018***	0.059	0.018***	-0.026
Endowment	403	0.143	0.013	0.054	0.011***	0.054	0.011***	-0.031**
Foundation	417	0.192	0.015	0.055	0.014***	0.058	0.014***	-0.028**
Venture	2,235	0.263	0.007	0.163	0.006***	0.164	0.006***	
Public Pension	1,002	0.359	0.012	0.235	0.011***	0.237	0.011***	
Private Pension	236	0.114	0.017	0.056	0.012***	0.054	0.012***	-0.183***
Endowment	529	0.204	0.014	0.122	0.012***	0.122	0.012***	-0.115***
Foundation	468	0.201	0.016	0.112	0.013***	0.113	0.013***	-0.124***
Real Estate	889	0.268	0.011	0.150	0.010***	0.155	0.011***	
Public Pension	618	0.311	0.013	0.194	0.012***	0.201	0.012***	
Private Pension	42	0.294	0.060	0.135	0.049***	0.132	0.048***	-0.069
Endowment	80	0.125	0.035	0.051	0.032	0.052	0.032	-0.150***
Foundation	149	0.160	0.025	0.027	0.025	0.026	0.025	-0.175***
Other	2,074	0.147	0.006	0.067	0.005***	0.069	0.005***	
Public Pension	1,024	0.152	0.008	0.072	0.007***	0.076	0.007***	
Private Pension	139	0.211	0.027	0.097	0.021***	0.096	0.021***	0.019
Endowment	381	0.110	0.013	0.059	0.012***	0.061	0.012***	-0.016
Foundation	530	0.148	0.013	0.053	0.012***	0.055	0.012***	-0.021*
By Time Period								
1980s	267	0.297	0.022	0.187	0.022***	0.184	0.023***	
1990s	1058	0.248	0.010	0.148	0.009***	0.148	0.009***	
2000s	1,443	0.180	0.007	0.095	0.006***	0.097	0.006***	

Table 6

In-State Overweighting Regressions on LP Type Indicators and Controls

The table presents regressions in which the dependent variable is the LP's excess share of in-state investments, relative to the benchmark representing the share of investments in the state by out-of-state LP's, over the preceding five year period. The observation is an LP-year. The independent variables are the natural logarithm of the size the LP's private equity portfolio in dollar terms, the year of the LP's first investment, and indicator variables for LP type (the omitted category is foundations). Standard errors are clustered at the level of the LP. All models include vintage year fixed effects. Broad investment type fixed effects include indicator variables for Buyout, Venture, Real Estate, and Other. Narrow investment type fixed effects include indicator variables for Buyout, Early Stage VC, General/Late Stage VC, Real Estate , Fund of Funds, Distressed Debt, Natural Resources, and Other. *** significant at the 1% level, ** significant at the 5% level, * significant at the 10% level.

Dependent Variable: Excess Share of In-State Investments by LP				
Public Pension	0.124***	0.072***	0.077***	0.077***
	(0.028)	(0.027)	(0.027)	(0.027)
Private Pension	0.030	0.015	0.013	0.012
	(0.031)	(0.031)	(0.031)	(0.031)
Public Endowment	0.002	-0.002	0.000	0.002
	(0.026)	(0.025)	(0.024)	(0.024)
Private Endowment	0.013	-0.053*	-0.058*	-0.058*
	(0.029)	(0.030)	(0.030)	(0.030)
ln(Size of LP's PE Portfolio)	-0.025***	-0.015***	-0.017***	-0.017***
	(0.006)	(0.005)	(0.005)	(0.006)
Year of LP's First Investment	0.001	0.002*	0.003**	0.003**
	(0.001)	(0.001)	(0.001)	(0.001)
Constant	-2.559	-4.795*	-5.362**	-5.492**
	(2.539)	(2.706)	(2.689)	(2.680)
Vintage Fixed Effects	Yes	Yes	Yes	Yes
State of LP Fixed Effects	No	Yes	Yes	Yes
Investment Type Fixed Effects	No	No	Broad	Narrow
Observations	4,407	4,407	4,407	4,407
Adjusted R-Squared	0.07	0.18	0.19	0.19

Table 7

Net IRR Differences

This table shows t-tests of differences in net IRR between in-state and out-of-state investments. The left panel analyzes the IRR minus the mean of all other observations in the same state and vintage of the investment fund (the GP), the middle panel examines the IRR minus the mean of all other observations in the same state, vintage, and broad investment type (Buyout, Venture, Real Estate, Other), and the right panel examines the IRR minus the mean of all other observations in the same state, vintage and narrow investment type of the investment fund (Buyout, Early Stage VC, General/Late Stage VC, Real Estate , Fund of Funds, Distressed Debt, Natural Resources, and Other). Each set of three rows consists of a row of means, a row of standard deviations in brackets, and a third row with observation counts and t-statistics. The t-statistic is for the test with null hypothesis that the difference between the out-of-state IRRs and the in-state IRRs equals zero. *** significant at the 1% level.

	IRR Net of Group Means								
Group:	State x Vintage			State x Vintage x Broad Type			State x Vintage x Narrow Type		
	Out of State	In State	Difference	Out of State	In State	Difference	Out of State	In State	Difference
All	0.48	-2.39	**2.87*****	0.34	-1.68	**2.02*****	0.32	-1.61	**1.93*****
	[0.22]	[0.47]	[0.53]	[0.18]	[0.37]	[0.44]	[0.17]	[0.35]	[0.42]
	12400	2481	t=5.4	12400	2481	t=4.6	12400	2481	t=4.6
Public Pension	-0.05	-3.80	**3.75*****	-0.02	-2.62	**2.60*****	-0.01	-2.57	**2.56*****
	[0.27]	[0.60]	[0.63]	[0.22]	[0.46]	[0.51]	[0.21]	[0.45]	[0.49]
	7825	1752	t=6.0	7825	1752	t=5.1	7825	1752	t=5.3
Private Pension	-1.77	-3.54	1.77	-0.96	-1.93	0.96	-1.02	-1.22	0.20
	[0.75]	[1.41]	[1.77]	[0.63]	[1.21]	[1.48]	[0.59]	[1.15]	[1.40]
	753	157	t=1.0	753	157	t=0.7	753	157	t=0.14
Endowment	2.39	1.76	0.63	1.57	0.65	0.92	1.61	0.73	0.88
	[0.65]	[1.21]	[1.77]	[0.54]	[0.95]	[1.48]	[0.52]	[0.91]	[1.40]
	1982	286	t=0.4	1982	286	t=0.6	1982	286	t=0.6
Public Endowment	1.06	1.66	-0.60	0.77	-0.86	1.62	0.75	-0.18	0.92
	[0.83]	[1.69]	[2.92]	[0.69]	[1.10]	[2.44]	[0.65]	[0.82]	[2.28]
	1021	84	t=-0.2	1021	84	t=0.7	1021	84	t=0.4
Private Endowment	3.80	1.80	2.00	2.43	1.27	1.16	2.53	1.11	1.42
	[1.01]	[1.57]	[2.33]	[0.85]	[1.26]	[1.93]	[0.81]	[1.25]	[1.86]
	961	202	t=0.9	961	202	t=0.6	961	202	t=0.8
Foundation	1.59	2.70	-1.11	1.04	1.84	-0.80	0.89	1.73	-0.83
	[0.57]	[1.04]	[1.49]	[0.47]	[0.92]	[1.24]	[0.44]	[0.80]	[1.16]
	1840	286	t=-0.7	1840	286	t=-0.6	1840	286	t=-0.7
Non Public Pension	1.38	0.99	0.40	0.94	0.56	0.38	0.89	0.70	0.19
	[0.38]	[0.70]	[1.00]	[0.32]	[0.58]	[0.83]	[0.30]	[0.54]	[0.79]
	4575	729	t=0.4	4575	729	t=0.4	4575	729	t=0.2

Table 8

Excess Share and Performance for Public Sector Pension Funds, with Controls for LP and GP Size

This table examines the relation between whether an investment is in-state and performance. variables In-State and Neighbor State are indicators for whether the investment is in-state or in a neighboring state, respectively. The variable Excess LP In-State Share is the difference between the LP's in-state share and the predicted in-state share based on the the state's share of all investments that are not in-state investments over the preceding five year period. Regressions have constants, which to conserve space are not shown. Standard errors are clustered by vintage. *** significant at the 1% level, ** at the 5% level, * at the 10% level.

Panel A: Net IRR Net of Group Mean

	State x Vintage		State x Vintage x Broad Type		State x Vintage x Narrow Type	
In-State	-3.61***	-3.05***	-2.25***	-1.69**	-2.11***	-1.73***
	(0.87)	(0.92)	(0.64)	(0.67)	(0.57)	-(0.57)
Neighbor State	0.55	0.28	0.71	0.79	0.75	0.84
	(0.81)	(0.85)	(0.59)	(0.59)	(0.51)	(0.53)
Excess LP In-State Share	-6.93*	-6.98**	-4.69**	-4.60**	-4.60***	-4.35***
	(3.55)	(3.21)	(1.89)	(1.92)	(1.49)	(1.52)
In-State x Excess LP Share	4.92	5.36	2.46	3.37	1.67	1.69
	(3.48)	(3.30)	(2.87)	(3.25)	(2.63)	(2.96)
ln(Size of LP's PE Portfolio)	0.06	-0.09	0.38***	0.27	0.26***	0.18
	(0.20)	(0.22)	(0.10)	(0.12)	(0.10)	(0.12)
ln(Size of GP's PE Fund)		0.95*		1.01***		0.55**
		(0.52)		(0.36)		(0.27)
Year of LP's First Investment		-0.14***		-0.11**		-0.08*
		(0.05)		(0.05)		(0.04)
Observations	9048	8615	9048	8615	9048	8615

Panel B: Multiple of Invested Capital Net of Group Mean

	State x Vintage		State x Vintage x Broad Type		State x Vintage x Narrow Type	
In-State	-0.16***	-0.12**	-0.11***	-0.08*	-0.10***	-0.07*
	(0.05)	(0.05)	(0.04)	(0.04)	(0.04)	(0.04)
Neighbor State	0.01	0.00	0.02	0.03	0.01	0.03
	(0.04)	(0.04)	(0.03)	(0.03)	(0.02)	(0.03)
Excess LP In-State Share	-0.01	-0.01	0.03	0.06	0.01	0.04
	(0.20)	(0.17)	(0.13)	(0.14)	(0.10)	(0.12)
In-State x Excess LP Share	0.32	0.32	0.13	0.20	0.02	0.03
	(0.33)	(0.30)	(0.23)	(0.27)	(0.22)	(0.24)
ln(Size of LP's PE Portfolio)	0.00	-0.01	0.00	0.00	0.00	0.00
	(0.01)	(0.00)	(0.01)	(0.01)	(0.00)	(0.01)
ln(Size of GP's PE Fund)		0.05*		0.06***		0.05**
		(0.02)		(0.02)		(0.02)
Year of LP's First Investment		-0.01*		0.00		0.00
		(0.00)		(0.00)		(0.00)
Observations	10477	10010	10477	10010	10477	10010

Table 9

Why Do Public Pension Funds Overweight In-State Investments?

The dependent variable is the difference between the LP's in-state share over the preceding five year period and the predicted in-state share based on the second five-year rolling benchmark (the state's share of all investments that are not in-state investments over the preceding five year period). The level of observation is an LP-year. The corruption index is from Glaeser and Saks (2006). The Corruption BL Survey is based on Boylan and Long as reported in the *New York Times* by Marsh (2008). The BL Non-Response variable is a corruption indicator for whether no state house reporters responded to the corruption survey. Education is the percentage of state residents over 25 with Bachelor's Degree, from the U.S. Census. Gross State Product data are from the BEA. The funding ratio is the ratio of assets to liabilities as of the 2008 actuarial valuations of the public pension systems. Teachers is an indicator for whether the pension system represents at least some teachers, and Public Safety is an indicator for whether the pension system represents at least some public safety officials. All models include vintage year fixed effects. Standard errors are clustered by state of LP. *** significant at the 1% level, ** significant at the 5% level, * significant at the 10% level.

Dependent Variable: Excess Share of In-State Investments by LP, Difference

	Public Pension Funds Only				
Corruption Index	0.547***		0.654***	0.426***	0.523**
	(0.181)		(0.159)	(0.165)	(0.205)
Corruption BL Survey		0.051**	-0.003		
		(0.025)	(0.025)		
Corruption BL Non-Response		0.389***	0.216**		
		(0.089)	(0.090)		
Education				-0.005	-0.003
				(0.007)	(0.008)
Growth in Gross State Product				0.271	0.26
				(0.420)	(0.420)
Gross State Product, $T				-0.098***	-0.101**
				(0.038)	(0.040)
ln(GSP)				0.163	0.159
				(0.100)	(0.098)
ln(Population of State)				-0.096	-0.065
				(0.102)	(0.100)
ln(Size of LP's PE Portfolio)				-0.002	-0.005
				(0.008)	(0.010)
Year of LP's First Investment				0.002	0.003
				(0.004)	(0.004)
Funding Ratio (2008)				-0.217**	-0.280***
				(0.101)	(0.100)
Teachers					0.068
					(0.055)
Public Safety					0.012
					(0.029)
Board Capture Ratio					0.082
					(0.064)
Constant	0.017	-0.051	-0.031	-1.76	-3.635
	(0.062)	(0.078)	(0.072)	(8.233)	(7.967)
Observations	1,930	1,930	1,930	1,554	1,545
Adjusted R-Squared	0.07	0.12	0.16	0.16	0.17

Table 10

Why Do Other Institutional Investors Overweight Home-State Investments?

The dependent variable is the difference between the LP's in-state share over the preceding five year period and the predicted in-state share based on the second five-year rolling benchmark (the state's share of all investments that are not in-state investments over the preceding five year period). The level of observation is an LP-year. The corruption index is from Glaeser and Saks (2006). Education is the percentage of state residents over 25 with Bachelor's Degree, from the U.S. Census. Gross State Product data are from the BEA. All models include vintage year fixed effects. Standard errors are clustered by state of LP. *** significant at the 1% level, ** significant at the 5% level, * significant at the 10% level.

Dependent Variable: Excess Share of In-State Investments by LP, Difference					
Sample	Public Pension	Public Endowment	Private Endowment	Private Pension	Foundation
Corruption Index	0.494***	0.154	-0.584**	0.251	-0.262
	(0.148)	(0.222)	(0.245)	(0.214)	(0.273)
Education	0.005	-0.004	0.018**	0.014	0.009
	(0.008)	(0.007)	(0.008)	(0.013)	(0.010)
Growth in Gross State Product	0.034	0.206	0.238	-0.067	-0.294
	(0.429)	(0.541)	(0.796)	(0.547)	(0.508)
Gross State Product, $T	-0.189***	0.101*	-0.034	0.270	0.036
	(0.058)	(0.056)	(0.075)	(0.205)	(0.066)
ln(GSP)	0.169	0.158	-0.585*	-0.483	-0.247
	(0.170)	(0.279)	(0.297)	(0.354)	(0.371)
ln(Population of State)	-0.079	-0.170	0.702**	0.387	0.296
	(0.182)	(0.298)	(0.318)	(0.337)	(0.384)
ln(Size of LP's PE Portfolio)	-0.025***	-0.012	-0.027	0.001	-0.037***
	(0.009)	(0.014)	(0.022)	(0.014)	(0.009)
Year of LP's First Investment	0.002	-0.000	-0.002	0.005**	0.001
	(0.003)	(0.002)	(0.003)	(0.002)	(0.003)
Constant	-2.31	3.59	-7.87	-16.86**	-6.93
	(7.39)	(8.19)	(8.75)	(7.61)	(8.19)
Observations	1,852	384	588	422	998
Adjusted R-Squared	0.17	0.04	0.10	0.05	0.07

Table 11

State Corruption and Performance for Different Types of LPs

The dependent variables are the performance measures: Net IRR demeaned by state-vintage-type cell in Panel A, and Multiple of Invested Capital demeaned by state-vintage-type cell in Panel B. The corruption index is from Glaeser and Saks (2006). Standard errors are clustered by vintage. *** significant at the 1% level, ** significant at the 5% level, * significant at the 10% level.

Panel A: Dependent Variable = Net IRR Minus State x Vintage x Type Mean				
	Public Pension		*All Other LPs*	
Corruption Index	2.47	1.02	-0.42	0.06
	(2.76)	(2.45)	(2.19)	(2.06)
Corruption Index x In-State	7.41	6.53	-2.62	-3.20
	(5.01)	(4.95)	(5.37)	(5.41)
In-State	-4.76	-2.41	0.39	-3.85
	(1.93)**	(4.54)	(1.97)	(6.73)
Education		-0.14		0.01
		(0.05)**		(0.08)
Education x In-State		-0.24		0.13
		(0.11)**		(0.12)
ln(Size of LP's PE Portfolio)		0.04		-0.05
		(0.18)		(0.19)
ln(size) x In-State		0.57		-0.04
		(0.49)		(0.31)
Year of First Investment		-0.13		-0.16
		(0.05)***		(0.05)***
Year First Invest x In-State		-0.00		0.08
		(0.08)		(0.13)
Constant	-0.69	251.56	1.09	328.21
	(0.71)	(90.54)***	(0.62)*	(99.32)***
Observations	9,564	9,529	5,251	5,248
Adjusted R-Squared	0.00	0.01	0.00	0.00
Panel B: Dependent Variable = Multiple Minus State x Vintage x Type Mean				
	Public Pension		*All Other LPs*	
Corruption Index	0.074	0.031	-0.134	-0.099
	(0.097)	(0.095)	(0.280)	(0.277)
Corruption Index x In-State	0.469	0.451	-0.639	-0.527
	(0.292)	(0.303)	(0.665)	(0.573)
In-State	-0.207	0.078	0.243	-0.822
	(0.134)	(0.366)	(0.242)	(0.548)*
Education		-0.003		-0.008
		(0.002)		(0.006)
Education x In-State		-0.008		0.010
		(0.004)**		(0.012)
ln(Size of LP's PE Portfolio)		-0.007		-0.017
		(0.010)		(0.022)
ln(size) x In-State		0.001		0.067
		(0.035)		(0.045)
Year of First Investment		-0.003		-0.008
		(0.002)		(0.005)
Year First Invest x In-State		-0.005		0.022
		(0.004)		(0.013)*
Constant	-0.054	6.504	0.122	16.141
	(0.024)**	(4.532)	(0.081)	(10.547)
Observations	11,076	10,842	5,817	5,782
Adjusted R-Squared	0.01	0.01	0.00	0.00

Table 12

Public Pension Home-State Overweighting and Underperformance Relative to Vintage-by-Type Means

This table shows public pension fund home-state weighting and performance statistics using calculations that reflect the vintage (year) and type composition of investments. The first column shows the predicted in-state share of public pension fund PE investments, using 5-year rolling benchmarks. The second column shows the excess in-state share relative to the predicted share in the first column. The net IRR columns show the net IRR of different investments. The first net IRR column shows the net IRR of in-state public pension PE investments by in-state LPs, relative to vintage means. The second net IRR column shows the net IRR of out-of-state public pension PE investments by in-state LPs. The third column shows the net IRR of public pension PE investments in the state by out-of-state LPs. Only the 25 states for which all variables could be calculated are shown.

	In-State Share		Net IRR – Vintage x Type			Size of PE
	5yr Rolling		LP in	LP out	LP in	Program
	Predicted	Excess	GP in	GP in	GP out	$ bn
CA	23.7	9.1	-0.34	2.42	-0.19	56.9
CO	1.0	7.8	-7.74	-11.41	-2.62	2.9
CT	9.1	4.0	-13.72	2.67	-0.60	1.4
DC	1.3	1.4	6.98	0.05	-14.24	0.6
FL	1.0	0.3	-49.60	-1.80	-0.61	4.4
ID	0.0	3.0	7.71	2.83	1.24	0.8
IL	6.8	14.3	-10.46	-5.25	1.51	6.8
IN	0.0	3.9	-22.51	3.03	3.27	1.4
MA	18.5	26.5	-7.61	1.96	1.53	5.9
MD	1.2	5.3	-28.64	-0.01	-5.99	1.4
MI	0.2	2.1	0.85	-0.45	-2.13	8.1
MN	0.6	10.8	-8.75	0.91	1.40	3.5
NC	0.5	15.5	-22.34	-11.59	1.25	7.1
NH	0.1	2.0	-5.03	-5.71	-13.21	0.1
NJ	1.4	0.9	-1.14	-8.42	2.79	3.7
NY	24.2	16.2	0.11	1.06	-3.93	23.3
OH	1.1	25.3	-19.88	-10.97	-4.21	7.5
OR	0.1	1.0	11.58	11.30	3.08	9.3
PA	1.0	16.6	-12.19	-17.23	0.82	15.0
RI	0.8	6.4	8.92	2.61	0.49	0.6
TN	0.2	27.7	-5.08	-6.22	-5.46	0.5
TX	5.9	11.4	-5.23	-3.33	0.02	10.3
VA	0.7	1.8	-1.29	-4.00	3.99	4.4
WA	0.7	4.2	-12.86	-10.23	-0.47	13.7
WI	0.0	2.7	0.89	-1.28	-1.37	4.7
Avg	4.0	8.8	-7.89	-2.76	-1.35	
Difference with LP(in)GP(in)						
			Avg	-5.1	-6.5	
			Wtd Avg	-3.4	-5.2	

Table 13

Financial Effects of Overweighting and Underperformance for Public Pension Funds

This table shows the financial effects of home-state overweighting and underperformance for public pension funds. The left panel uses the investments by out-of-state LPs in the state as a benchmark, and the right panel uses the investments by state LPs outside of the state as a benchmark. Predicted and excess shares are based on the 5-year rolling benchmarks shown in Table 12. The first column is therefore the IRR difference between home-state investments and investments by out-of-state LPs in the state, times the predicted in-state share. The second column is the IRR difference between home-state investments and investments by out-of-state LPs in the state, times the excess in-state share. The third column is the sum of the first two columns. The right panel presents the analogous calculations for the benchmark of state LP investments outside of the state. IRRs are calculated net of vintage and type of investment (Buyout, Venture, Real Estate, and Other).

All figures in $ millions per year

	Relative to Out-of-State LPs Investing in State			Relative to In-State LPs Investing Out-of-State		
	LP(in)GP(in) – LP(out)GP(in)			LP(in)GP(in) – LP(in)GP(out)		
	Predicted	Excess	Total	Predicted	Excess	Total
CA	(372)	(142)	(514)	(20)	(8)	(28)
CO	1	8	9	(1)	(12)	(13)
CT	(21)	(9)	(30)	(17)	(7)	(24)
DC	1	1	1	2	2	3
FL	(20)	(6)	(26)	(20)	(6)	(27)
ID	0	1	1	0	2	2
IL	(24)	(50)	(74)	(55)	(116)	(171)
IN	(0)	(14)	(14)	(0)	(14)	(14)
MA	(104)	(149)	(253)	(99)	(142)	(241)
MD	(5)	(21)	(26)	(4)	(17)	(20)
MI	0	2	2	1	5	6
MN	(2)	(36)	(39)	(2)	(38)	(40)
NC	(4)	(118)	(122)	(8)	(259)	(267)
NH	0	0	0	0	0	0
NJ	4	3	6	(2)	(1)	(3)
NY	(54)	(36)	(89)	228	152	380
OH	(8)	(170)	(177)	(13)	(299)	(312)
OR	0	0	0	1	8	9
PA	8	125	132	(20)	(322)	(342)
RI	0	2	3	0	3	4
TN	0	2	2	0	1	1
TX	(12)	(22)	(34)	(32)	(62)	(94)
VA	1	2	3	(2)	(4)	(6)
WA	(2)	(15)	(17)	(12)	(71)	(82)
WI	0	3	3	0	3	3
Total	(612)	(640)	(1252)	(76)	(1201)	(1278)

Figure 1: Underperformance of In-State Public Pension PE Investments by Category

The graph shows the relative performance of public pension PE investments in-state versus out-of-state by category, with a t-statistic for whether the performance is equal. Performance is measured as net IRR minus the mean of all other investments in the same vintage and GP state. T-statistics of statistical tests for the equality of in-state versus out of state performance are presented at the bottom of the figure.

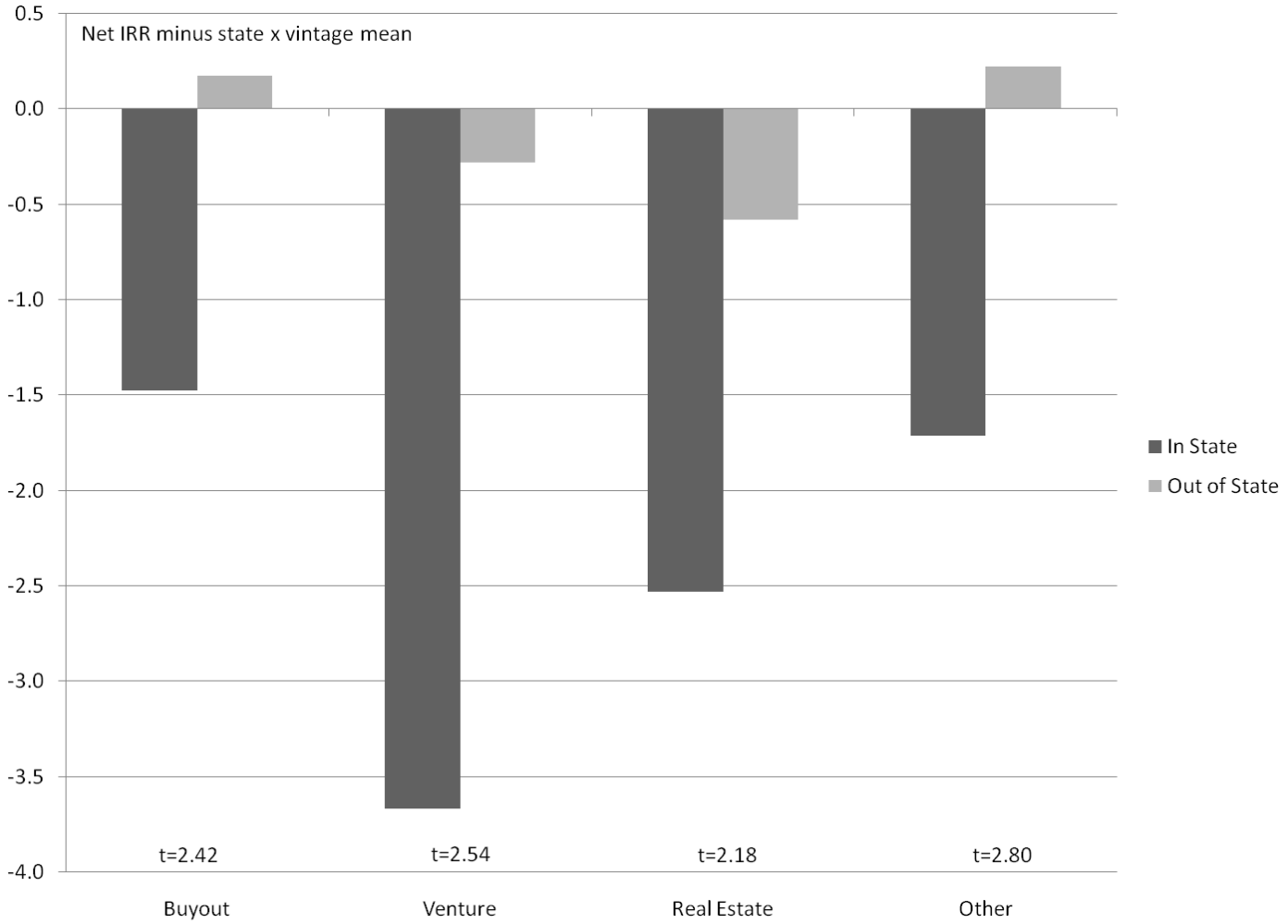


Figure 2: Total Financial Effects of In-State PE Investment, Relative to Investments by Out-of-State LPs into the Home State

This figure presents estimates of the financial effects of overweighting and underperformance as a share of total pension plans assets invested in private equity and as a share of annual contributions to the pension funds. The figure is based on the differential between the performance of state public pension LPs investing in the state versus the performance of out-of-state LPs investing in the state, LP(in)GP(in) – LP(out)GP(in).

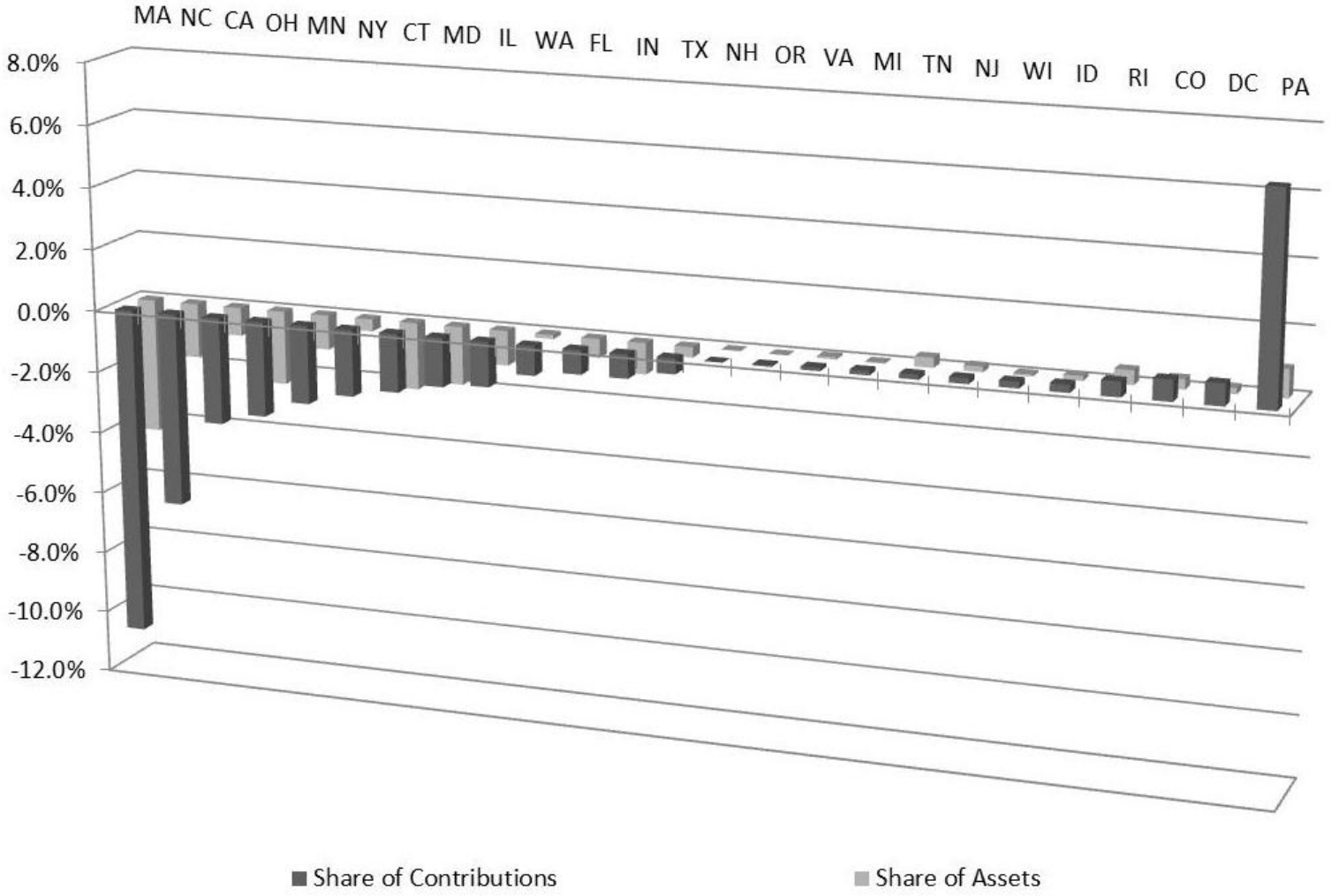
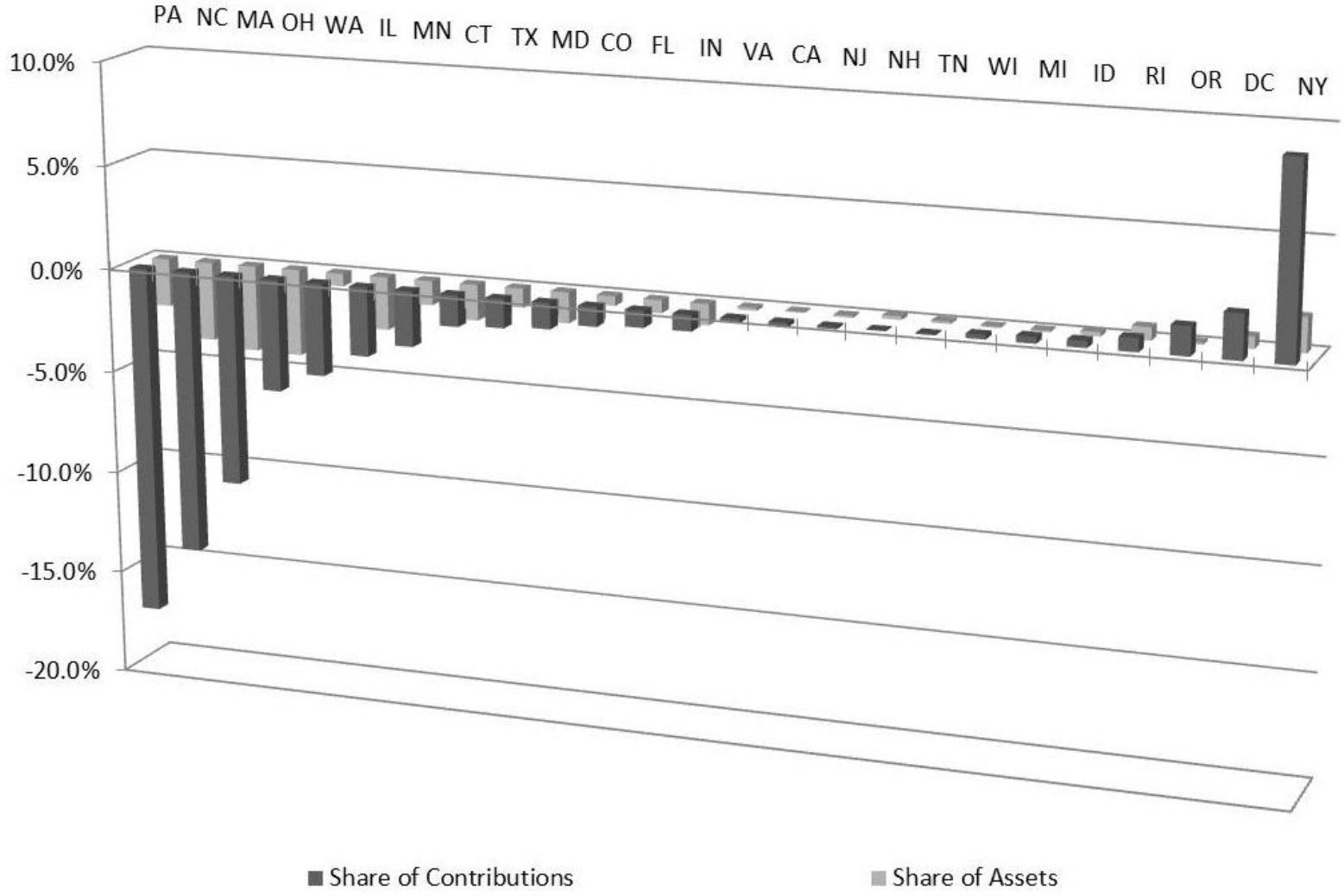


Figure 3: Total Financial Effects of In-State PE Investment, Relative to Investments Out-of-State

This figure presents estimates of the financial effects of overweighting and underperformance as a share of total pension plans assets invested in private equity and as a share of annual contributions to the pension funds. The figure is based on the differential of in-state versus out-of-state investments for a state's LPs, that is, LP(in)GP(in) – LP(in)GP(out)



Appendix Tables For

Local Overweighting and Underperformance: Evidence from Limited Partner Private Equity Investments

Appendix Table A1

Number of Investments by Investment Type and Limited Partner (LP) Type

The table presents the number of investments by type of LP and by type of investment. Percentages represent the percent of the total investments by the LP type in each row.

Limited Partner (LP) Type	Buyout	Venture	Real Estate	Other	Total
Public Sector Pension Fund	3,773	3,020	1,894	3,112	11,799
	32%	26%	16%	26%	100%
Private Sector Pension Fund	425	391	87	202	1,105
	38%	35%	8%	18%	100%
Endowment	769	1,180	237	776	2,962
	26%	40%	8%	26%	100%
Private Institution	462	781	59	222	1,524
	30%	51%	4%	15%	100%
Public Institution	307	399	178	554	1,438
	21%	28%	12%	39%	100%
Foundation	715	971	271	1,005	2,962
	24%	33%	9%	34%	100%
Total	5,682	5,562	2,489	5,095	18,828
	30%	30%	13%	27%	

Appendix Table A2

Geographical Distribution of Investments

This table presents the geographical distribution of sample PE investments, by the state where the fund is headquartered. Nine states without PE investments are not shown: AK, HI, KS, MS, MT, ND, NV, SD, and WV. The first set of columns gives the total number of investments. The second set gives the total number of PE investments in the state by out-of-state LPs. The third set gives the number of PE investments by in-state LPs.

	Total		by Out-of-State LPs		by In-State LPs	
State(GP)	(1)	(2)	(3)	(4)	(5)	(6)
AL	2	0.01%	2	0.01%	0	0.00%
AR	1	0.01%	0	0.00%	1	0.03%
AZ	1	0.01%	0	0.00%	1	0.03%
CA	4,865	25.84%	3,672	23.42%	1,193	37.87%
CO	187	0.99%	152	0.97%	35	1.11%
CT	1,307	6.94%	1,271	8.11%	36	1.14%
DC	280	1.49%	277	1.77%	3	0.10%
DE	3	0.02%	3	0.02%	0	0.00%
FL	140	0.74%	138	0.88%	2	0.06%
GA	38	0.20%	36	0.23%	2	0.06%
IA	10	0.05%	8	0.05%	2	0.06%
ID	7	0.04%	4	0.03%	3	0.10%
IL	1,358	7.21%	1,075	6.86%	283	8.98%
IN	27	0.14%	9	0.06%	18	0.57%
KY	4	0.02%	1	0.01%	3	0.10%
LA	2	0.01%	0	0.00%	2	0.06%
MA	3,182	16.90%	2,776	17.71%	406	12.89%
MD	175	0.93%	163	1.04%	12	0.38%
ME	5	0.03%	5	0.03%	0	0.00%
MI	55	0.29%	40	0.26%	15	0.48%
MN	148	0.79%	107	0.68%	41	1.30%
MO	18	0.10%	9	0.06%	9	0.29%
NC	89	0.47%	57	0.36%	32	1.02%
NE	8	0.04%	4	0.03%	4	0.13%
NH	10	0.05%	8	0.05%	2	0.06%
NJ	253	1.34%	245	1.56%	8	0.25%
NM	3	0.02%	2	0.01%	1	0.03%
NY	4,400	23.37%	3,853	24.58%	547	17.37%
OH	293	1.56%	172	1.10%	121	3.84%
OK	27	0.14%	27	0.17%	0	0.00%
OR	22	0.12%	15	0.10%	7	0.22%
PA	307	1.63%	163	1.04%	144	4.57%
RI	153	0.81%	142	0.91%	11	0.35%
SC	1	0.01%	0	0.00%	1	0.03%
TN	42	0.22%	36	0.23%	6	0.19%
TX	1,087	5.77%	938	5.98%	149	4.73%
UT	9	0.05%	7	0.04%	2	0.06%
VA	124	0.66%	117	0.75%	7	0.22%
VT	9	0.05%	9	0.06%	0	0.00%
WA	154	0.82%	129	0.82%	25	0.79%
WI	21	0.11%	5	0.03%	16	0.51%
WY	1	0.01%	1	0.01%	0	0.00%
Total	18,828	100.00%	15,678	100.00%	3,150	100.00%
Mean		1.96%		1.96%		1.96%
Median		0.10%		0.06%		0.10%

Appendix Table A3

Geographical Distribution of Investments by Capital Committed

This table presents the geographical distribution of capital committed to PE investments, by the state where the fund is headquartered. Nine states without PE investments are not shown: AK, HI, KS, MS, MT, ND, NV, SD, and WV. Four states without known commitments are not shown: AL, AR, NM, and WY. The first set of columns gives the total dollar value of investments. The second set gives the total dollar value of PE investments in the state by out-of-state LPs. The third set gives the dollar value of PE investments by in-state LPs.

	Total		by Out-of-State LPs		by In-State LPs	
State(GP)	(1)	(2)	(3)	(4)	(5)	(6)
AZ	22	0.0%	0	0.0%	22	0.0%
CA	97,541	19.6%	64,551	14.8%	32,990	54.4%
CO	3,114	0.6%	2,647	0.6%	467	0.8%
CT	28,943	5.8%	26,684	6.1%	2,259	3.7%
DC	16,103	3.2%	16,067	3.7%	35	0.1%
DE	13	0.0%	13	0.0%	0	0.0%
FL	1,258	0.3%	1,243	0.3%	15	0.0%
GA	528	0.1%	528	0.1%	0	0.0%
IA	389	0.1%	379	0.1%	10	0.0%
ID	60	0.0%	32	0.0%	28	0.0%
IL	22,395	4.5%	19,007	4.4%	3,388	5.6%
IN	161	0.0%	114	0.0%	47	0.1%
KY	24	0.0%	0	0.0%	24	0.0%
LA	11	0.0%	0	0.0%	11	0.0%
MA	50,952	10.3%	49,185	11.3%	1,767	2.9%
MD	2,714	0.5%	2,566	0.6%	148	0.2%
ME	4	0.0%	4	0.0%	0	0.0%
MI	715	0.1%	490	0.1%	225	0.4%
MN	7,267	1.5%	6,148	1.4%	1,119	1.8%
MO	47	0.0%	35	0.0%	12	0.0%
NC	2,102	0.4%	1,397	0.3%	705	1.2%
NE	310	0.1%	290	0.1%	20	0.0%
NH	42	0.0%	28	0.0%	14	0.0%
NJ	6,023	1.2%	5,773	1.3%	250	0.4%
NY	189,079	38.1%	183,127	42.0%	5,952	9.8%
OH	3,228	0.6%	1,812	0.4%	1,416	2.3%
OK	141	0.0%	141	0.0%	0	0.0%
OR	791	0.2%	644	0.1%	147	0.2%
PA	8,081	1.6%	4,381	1.0%	3,700	6.1%
RI	7,469	1.5%	7,323	1.7%	146	0.2%
SC	20	0.0%	0	0.0%	20	0.0%
TN	194	0.0%	194	0.0%	0	0.0%
TX	42,502	8.6%	37,862	8.7%	4,640	7.6%
UT	50	0.0%	45	0.0%	5	0.0%
VA	2,923	0.6%	2,514	0.6%	409	0.7%
VT	130	0.0%	130	0.0%	0	0.0%
WA	1,181	0.2%	813	0.2%	368	0.6%
WI	390	0.1%	95	0.0%	295	0.5%
Total	496,917	100%	436,262	100%	60,654	100%
mean		2.56%		2.56%		2.56%
median		0.14%		0.12%		0.08%

Appendix Table A4

Overweighting by LPs of In-State Investments, Pooled Across Time

The table presents the share of in-state investments by LPs located in each state and the equal-weighted and valued-weighted home bias of the portfolios of LPs located in each state. Column (1) is the percentage of in-state investments made by LPs that are located in the state. Column (2) presents the overweighting relative to all investments, calculated as the percent of in-state investments in column (1) of this table minus the state's share of all investments by all LPs in the full sample (pooled over time). Column (3) presents the overweighting relative to all out-of-state investments, calculated as the percent of in-state investments in column (1) of this table minus the state's share of all investments by out-of-state LPs in the full sample (also pooled over time). Columns (4), (5) and (6) repeat the exercises in columns (2), (3) and (4), value-weighting the investments by the dollar value of capital committed to the fund by the LP, and including only investments for which the capital committed by the LP is known. WY has no LPs in our sample. Nine states without PE investments are not shown: AK, HI, KS, MS, MT, ND, NV, SD, and WV. For three states (AL, AR, and NM), we have no investments with known commitment amount data.

	Equal Weighted			Value Weighted		
	Investments by LPs	Home Bias, % of Portfolio, Relative to		Investments by LPs	Home Bias, % of Portfolio, Relative to	
	% in state	All LPs	Out-of-State LPs	% in state	All LPs	Out-of-State LP
State(LP)	(1)	(2)	(3)	(4)	(5)	(6)
AL	0.0%	0.0%	0.0%			
AR	2.9%	2.9%	2.9%			
AZ	1.0%	1.0%	1.0%	0.6%	0.6%	0.6%
CA	35.1%	9.3%	11.7%	25.0%	5.3%	10.2%
CO	7.9%	6.9%	6.9%	4.5%	3.9%	3.9%
CT	10.4%	3.5%	2.3%	28.7%	22.9%	22.6%
DC	3.6%	2.1%	1.8%	22.1%	18.9%	18.5%
DE	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
FL	0.7%	0.0%	-0.1%	0.1%	-0.2%	-0.2%
GA	2.5%	2.3%	2.3%	0.0%	-0.1%	-0.1%
IA	0.9%	0.9%	0.9%	0.2%	0.1%	0.1%
ID	3.1%	3.1%	3.1%	1.3%	1.3%	1.3%
IL	18.7%	11.5%	11.8%	21.8%	17.3%	17.4%
IN	5.2%	5.0%	5.1%	0.8%	0.7%	0.8%
KY	3.3%	3.3%	3.3%	0.9%	0.9%	0.9%
LA	0.8%	0.8%	0.8%	0.1%	0.1%	0.1%
MA	41.5%	24.6%	23.8%	26.3%	16.1%	15.1%
MD	3.3%	2.4%	2.3%	2.7%	2.2%	2.1%
ME	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
MI	1.4%	1.1%	1.1%	0.9%	0.7%	0.7%
MN	9.7%	8.9%	9.0%	8.6%	7.1%	7.2%
MO	2.3%	2.2%	2.2%	0.3%	0.3%	0.3%
NC	6.9%	6.4%	6.5%	7.2%	6.8%	6.9%
NE	8.0%	8.0%	8.0%	3.1%	3.0%	3.0%
NH	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
NJ	2.8%	1.4%	1.2%	2.8%	1.6%	1.5%
NM	1.3%	1.3%	1.3%			
NY	28.0%	4.6%	3.4%	40.0%	1.9%	-2.0%
OH	19.8%	18.2%	18.7%	7.3%	6.7%	6.9%
OK	0.0%	-0.1%	-0.2%	0.0%	0.0%	0.0%
OR	2.2%	2.0%	2.1%	0.5%	0.3%	0.3%
PA	13.2%	11.5%	12.1%	8.7%	7.1%	7.7%
RI	8.6%	7.8%	7.7%	9.7%	8.2%	8.1%

SC	3.6%	3.6%	3.6%	1.4%	1.4%	1.4%
TN	12.8%	12.5%	12.5%	0.0%	0.0%	0.0%
TX	17.2%	11.4%	11.2%	14.2%	5.6%	5.5%
UT	2.9%	2.9%	2.9%	6.5%	6.5%	6.5%
VA	2.0%	1.3%	1.3%	3.7%	3.1%	3.1%
VT	0.0%	0.0%	-0.1%	0.0%	0.0%	0.0%
WA	4.6%	3.8%	3.7%	1.2%	0.9%	1.0%
WI	3.8%	3.7%	3.8%	2.1%	2.0%	2.1%
Mean	5.76%	3.80%	3.80%	6.72%	4.09%	4.09%
Median	2.53%	2.13%	2.06%	2.08%	1.74%	1.42%

Appendix Table A5

Overweighting Multiple Using 5-Year Rolling Benchmarks

The table presents the equal-weighted and valued-weighted home bias of the portfolios of LPs located in each state as in Table 5, but calculating overweighting as a multiple of the benchmark instead of as a difference. Multiples greater than one indicate overweighting. The unit of observation is [LP x vintage]. A multiple relative to out-of-state LP investments can only be calculated if there are out-of-state LP investments during the five years leading up to the year of observation. There are therefore two sets of observation counts: one for all [LP x vintage] observations in which there was an investment, and one for only those observations in which the out-of-state benchmark is nonzero.

	Equal Weighted			Value Weighted		
	LP x Vintage Count	Home Bias Multiple, Relative to		LP x Vintage Count	Home Bias Multiple, Relative to	
	All / Nonzero Out	All LPs	Out-of-State LPs	All / Nonzero Out	All LPs	Out-of-State LPs
State(LP)	(1)	(2)	(3)	(4)	(5)	(6)
AL	1 / 1	0.0	0.0			
AR	2 / 0	1679.4				
AZ	13 / 0	252.1		10 / 0	681.3	
CA	548 / 548	1.5	1.6	339 / 337	2.0	2.7
CO	124 / 122	10.0	12.0	88 / 76	16.2	45.3
CT	96 / 96	1.5	1.3	33 / 33	4.5	4.6
DC	58 / 58	1.3	1.1	5 / 5	0.9	0.8
DE	4 / 4	0.0	0.0	4 / 4	0.0	0.0
FL	51 / 51	2.7	2.5	23 / 23	0.5	0.6
GA	48 / 48	13.1	12.2	6 / 6	0.0	0.0
IA	34 / 32	4.7	2.9	18 / 16	7.5	7.6
ID	12 / 12	99.1	145.9	12 / 12	83.7	143.0
IL	318 / 318	4.1	4.3	167 / 167	6.8	8.6
IN	81 / 67	68.9	148.6	37 / 28	452.4	1028.6
KY	29 / 16	301.7	300.4	27 / 0	1985.9	
LA	16 / 0	309.9		14 / 0	784.4	
MA	394 / 394	2.8	2.7	143 / 143	4.0	3.7
MD	102 / 102	5.6	5.2	47 / 47	10.2	12.6
ME	5 / 5	0.0	0.0	0 / 0		
MI	153 / 153	5.8	8.3	52 / 52	2.4	3.7
MN	123 / 118	16.3	23.2	50 / 41	29.5	40.3
MO	92 / 52	90.0	152.4	24 / 19	334.1	500.9
NE	15 / 4	252.6	106.1	7 / 4	3775.2	7.3
NH	28 / 25	71.8	8.0	17 / 14	713.3	104.7
NJ	52 / 52	2.2	1.9	15 / 15	0.7	0.6
NM	14 / 14	215.5	268.2			
NY	553 / 553	1.2	1.2	61 / 61	1.0	0.9
OH	180 / 180	18.2	38.2	127 / 117	39.8	100.7
OK	24 / 24	0.0	0.0	11 / 11	0.0	0.0
OR	35 / 35	48.1	66.3	22 / 22	79.6	143.3
PA	214 / 202	10.5	19.7	76 / 67	20.4	53.6
RI	33 / 33	15.4	14.7	18 / 18	13.8	12.6
TN	28 / 28	69.6	76.9	5 / 5	0.0	0.0
TX	236 / 236	3.4	3.3	161 / 159	6.8	8.4
UT	11 / 11	171.6	194.9	7 / 7	763.4	760.2
VA	67 / 67	1.2	1.2	32 / 32	3.1	3.5
VT	9 / 9	0.0	0.0	5 / 5	0.0	0.0
WA	101 / 97	5.1	5.6	54 / 50	36.2	72.0
WI	72 / 24	46.3	67.2	42 / 16	12.1	77.3

Appendix Table A6

Home-State Overweighting Multiples, Overall and by LP Type

The table presents overweighting multiples of in-state investments, overall and by LP type, where the LP's in-state overweighting each year is calculated versus benchmarks based on the prior five years of investments. It is analogous to Table 6 but calculates overweighting as a multiple rather than a difference. The difference is taken with respect to the first benchmark so as not to lose [LP x vintage] observations with no out-of-state LP investors.

		In-State Investments		Excess over Baseline 1: Share of Investments in State by All LPs		Difference with Public Pension
Sample	N	mean	std err	mean	std err	
At Investment Level						
All	18,828	0.167	0.003			
States with PE	17,023	0.185	0.003	10.3	0.4***	
By LP Type						
Public Sector Pension	10,356	0.210	0.004	9.6	0.4***	
Private Sector Pension	1,057	0.184	0.012	5.4	0.8***	-4.2***
Endowment	2,796	0.135	0.006	13.8	1.1***	4.3***
Public Institution	1,305	0.087	0.008	20.8	2.0***	11.2***
Private Institution	1,491	0.177	0.010	7.7	1.0***	-1.8*
Foundation	2,814	0.144	0.007	11.2	1.5***	1.6
At LP-Year Level						
All	4,589	0.199	0.004			
States with PE	4,426	0.225	0.005	18.1	2.0***	
By LP Type						
Public Sector Pension	1,943	0.277	0.007	19.6	3.1***	
Private Sector Pension	445	0.187	0.013	8.4	2.0***	-11.2*
Endowment	995	0.163	0.009	20.3	4.7***	0.7
Public Institution	400	0.110	0.010	43.7	12.2***	24.1***
Private Institution	595	0.195	0.012	6.2	1.8***	-13.4**
Foundation	1,043	0.205	0.010	17.7	4.3***	-1.8

Appendix Table A7

In-State Overweighting by Investment Type and Time Period

The table presents overweighting of in-state investments, overall and by investment type, where the in-state overweighting each year is calculated versus benchmarks based on the prior five years of investments. The unit of observation in the top panel is the investment. *** significant at the 1% level, ** significant at the 5% level, * significant at the 10% level.

		In-State Investments		Excess over Baseline 1: Share of Investments in State by All LPs		Excess over Baseline 2: Share of Investments in State by Out-of-State LPs		Difference with Public Pension
Sample	N	mean	std err	mean	std err	mean	std err	
By Investment								
Buyout	5,241	0.150	0.005	0.051	0.005***	0.054	0.005***	
Public Pension	3,361	0.139	0.006	0.053	0.006***	0.058	0.006***	
Private Pension	422	0.230	0.021	0.053	0.018***	0.052	0.018***	-0.006
Endowment	754	0.138	0.013	0.062	0.012***	0.062	0.012***	0.004
Foundation	704	0.165	0.014	0.028	0.013**	0.031	0.013**	-0.027
Venture	5,331	0.239	0.006	0.115	0.005***	0.116	0.005***	
Public Pension	2,801	0.320	0.009	0.150	0.008***	0.154	0.008***	
Private Pension	391	0.113	0.016	0.051	0.013***	0.049	0.013***	-0.105***
Endowment	1,177	0.164	0.011	0.088	0.010***	0.088	0.010***	-0.066***
Foundation	962	0.146	0.011	0.068	0.009***	0.069	0.009***	-0.085***
Real Estate	1,787	0.252	0.010	0.127	0.010***	0.132	0.010***	
Public Pension	1,399	0.274	0.012	0.149	0.011***	0.156	0.012***	
Private Pension	63	0.286	0.057	0.110	0.052**	0.105	0.052**	-0.051
Endowment	97	0.113	0.032	0.048	0.030	0.048	0.031	-0.108**
Foundation	228	0.162	0.024	0.028	0.024	0.028	0.024	-0.128***
Other	4,500	0.143	0.005	0.061	0.005***	0.065	0.005***	
Public Pension	2,718	0.157	0.007	0.072	0.007***	0.078	0.007***	
Private Pension	194	0.180	0.028	0.069	0.024***	0.067	0.024***	-0.011
Endowment	686	0.102	0.012	0.058	0.011***	0.059	0.011***	-0.019
Foundation	902	0.124	0.011	0.028	0.010***	0.030	0.010***	-0.048***
By Time Period								
1980s	694	0.216	0.016	0.125	0.015***	0.125	0.015***	
1990s	5006	0.187	0.006	0.097	0.005***	0.098	0.005***	
2000s	11,694	0.173	0.004	0.113	0.003***	0.117	0.003***	

Appendix Table A8

Neighbor-State Overweighting Overall, by LP Type, and by Investment Type

The table presents overweighting of neighbor-state investments, overall and by LP type, where the LP's neighbor-state overweighting each year is calculated versus benchmarks based on the prior five years of investments. The unit of observation in the top panel is the investment, and in the bottom panel it is the LP-year. The first row of each panel shows statistics for the in-state investment indicator over all observations. The second row shows statistics for the observations for which funds exist in the state of the LP.

		Neighbor-State Investments		Excess over Baseline 1: Share of Investments in Neighbor by All LPs		Excess over Baseline 2: Share of Investments in Neighbor by Out-of-State LPs		Difference with Public Pension
Sample	N	mean	std err	mean	std err	mean	std err	
At Investment Level								
All	18,828	0.097	0.002					
States with PE	18,102	0.099	0.002	0.018	0.001***	0.008	0.001***	
By LP Type								
Public Sector Pension	11,167	0.087	0.003	0.000	0.001	-0.011	0.002***	
Private Sector Pension	1,105	0.129	0.010	0.041	0.005***	0.029	0.005***	0.040***
Endowment	2,933	0.092	0.005	0.042	0.003***	0.035	0.003***	0.046***
Public Institution	1,410	0.042	0.005	0.028	0.003***	0.027	0.003***	0.038***
Private Institution	1,523	0.139	0.009	0.054	0.005***	0.043	0.005***	0.054***
Foundation	2,890	0.140	0.006	0.055	0.003***	0.044	0.003***	0.055***
At LP-Year Level								
All	4,589	0.109	0.003					
States with PE	4,426	0.109	0.003	0.037	0.003***	0.027	0.003***	
By LP Type								
Public Sector Pension	1,943	0.084	0.004	0.010	0.004**	0.000	0.004	
Private Sector Pension	445	0.144	0.012	0.063	0.012***	0.052	0.012***	0.052***
Endowment	995	0.126	0.008	0.072	0.008***	0.064	0.008***	0.064***
Public Institution	400	0.059	0.008	0.047	0.008***	0.045	0.008***	0.045***
Private Institution	595	0.171	0.011	0.088	0.012***	0.077	0.012***	0.077***
Foundation	1,043	0.126	0.007	0.042	0.007***	0.030	0.007***	0.030***

Appendix Table A9

Net IRR Differences, Weighted by Size of Commitment

This table is analogous to a value-weighted version of Table 8. It shows t-tests of differences in net IRR between in-state and out-of-state investments, where the means are weighted by the size of the LP's commitment. The left panel analyzes the raw IRR, and the right panel examines the IRR minus the mean of all other observations in the same state and vintage of the investment fund (the GP). For some LP types, including private pensions and private endowments, the joint coverage of net IRR and LP commitment size would result in extremely small sample sizes, and hence these LP types are not shown.

	IRR Net of Group Means								
Group:	State x Vintage			State x Vintage x Broad Type			State x Vintage x Narrow Type		
	Out of State	In State	Difference	Out of State	In State	Difference	Out of State	In State	Difference
All	-0.89	-4.42	**3.54*****	-0.30	-1.74	**1.44*****	-0.39	-1.17	**0.78***
	7390	1431	t=5.8	7390	1431	t=3.1	7390	1431	t=1.8
Public Pension	-0.92	-4.62	**3.70*****	-0.27	-1.78	**1.51*****	-0.36	-1.18	**0.83***
	6663	1342	t=5.8	6663	1342	t=3.2	6663	1342	t=1.8
Endowment	1.07	3.47	-2.40	0.02	0.25	-0.24	-0.38	-0.00	-0.37
	688	75	t=-0.8	688	75	t=-0.0	688	75	t=-0.1
Public Endowment	1.11	3.47	-2.36	-0.01	0.25	-0.27	-0.42	-0.00	-0.41
	673	75	t=-0.8	673	75	t=-0.1	673	75	t=-0.1
Foundation	0.14	-0.16	0.29	-2.35	-7.02	4.67	-2.79	-6.95	4.16
	61	14	t=0.0	61	14	t=1.12	61	14	t=1.5
Non Public Pension	-0.10	3.24	-3.34	-1.07	-0.21	-0.86	-1.31	-0.44	-0.86
	757	89	t=-1.2	757	89	t=-0.3	757	89	t=-0.4