INVESTMENT WITH SOCIAL IMPACT: EVIDENCE FROM COMMERCIAL REAL ESTATE INVESTMENT BY PUBLIC PENSION FUNDS

Elyas D. Fermand

A dissertation submitted to the faculty at the University of North Carolina at Chapel Hill in partial fulfillment of the requirements for the degree of Doctor of Philosophy in the Department of Finance (Finance and Real Estate) at Kenan-Flagler Business School.

Chapel Hill
2021

Approved by:

Camelia M. Kuhnen

Jacob S. Sagi

Gregory W. Brown

Robert A. Connolly

Andra C. Ghent

ABSTRACT

Elyas D. Fermand: Investment with Social Impact: Evidence from Commercial Real Estate Investment by Public Pension Funds
(Under the direction of Camelia M. Kuhnen and Jacob S. Sagi)

This paper studies whether and how investments by public pension funds result in a different social impact, measured by employment growth, relative to investments by other large investors. Using commercial real estate (CRE) investments as a laboratory, I compare direct pension fund CRE investments to a counterfactual of real estate private equity (REPE) CRE investments. I document that CRE investments by public pension funds are associated with 3.5% higher zip code employment relative to REPE CRE investments. The effect is more pronounced for investments in the pension fund's home state and for pension funds with more political appointees on their board make investments that have a larger impact on employment. I also provide evidence for two potential mechanisms: (1) after a pension fund invests, $40M of additional capital from other investors flows to the invested zip code; and (2) pension funds invest 28% more CAPEX into their properties than REPE funds. Furthermore, investments earning bottom quartile returns exhibit large positive employment impact, especially for home state investments, evidence that suggests a trade-off between returns and social impact.

To my family, for their encouragement and love.

ACKNOWLEDGEMENTS

I am grateful to my committee Camelia Kuhnen (co-chair), Jacob Sagi (co-chair), and Gregory Brown for their invaluable advice, mentoring, and support. They have each played an integral role in helping me develop as a scholar and I could not have done this without them. Thanks also to Robert Connolly and Andra Ghent for their help and encouragement as I developed my dissertation. A special acknowledgement goes to my classmates Matteo Binfarè and Fotis Grigoris. Through all of the vicissitudes of the PhD, we forged a friendship that will last a lifetime. I feel fortunate that we joined UNC at the same time and got to share 5 years together. In addition, I appreciate the backing I received from the UNC Leonard W. Wood Center for Real Estate Studies. David Hartzell, Susan Drake, Jim Spaeth, and Mary Wade all helped to ensure the best possible experience for UNC's first Real Estate and Finance PhD student.

Thanks to my parents, Gerda and Saber, and my brother, Timur, for their love, support, and unwavering belief in me. I thank my wife, Paola, for her love, grace, and constant support; for staying up in solidarity when I worked late; and for being an overflowing source of joy and happiness in my life. Thank you to my son, Remy, for making each day exciting and filled with limitless potential.

Broadly, I thank Yasser Boualam, Dragana Cvijanovic, Jesse Davis, Andrei Gonçalves, Paige Ouimet, Xinxin Wang, and seminar participants at UNC Chapel Hill for their helpful comments. All errors are my own.

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CAPEX	Capital expenditure
CRE	Commercial real estate
GP	General Partner
IRR	Internal rate of return
LP	Limited Partner
NOI	Net operating income
REPE	Real estate private equity

CHAPTER 1

1.1 Introduction

Public pension funds may have investment motives beyond standard risk-return optimization. Recent literature suggests that agency problems, stemming from the political environment in which public pension funds operate, lead to poor financial performance. For instance, political representation on the board of trustees is associated with choosing underperforming private equity funds (Andonov et al. (2018)) and political pressure can result in overweighting local investments (Hochberg and Rauh (2013)). Moreover, regulatory incentives and underfunding amplify risk-taking behavior (Andonov et al. (2017)).[1] A less studied deviation from value maximization is having multiple objectives, stated or not, where capital is invested in projects that could potentially boost economic growth (i.e. have socially positive benefits). Recent work studies the return implications of this additional consideration. Barber et al. (2019) show that public pension funds earn lower returns on investments in “impact" VC funds which the authors interpret as evidence that social objectives do receive a weight in the objective function. However, there is no direct evidence that measures the social impact associated with investments by public pension funds. It is unclear whether public pension fund investments actually generate socially positive benefits that they value, how they do so relative to other large investors, and whether this social impact comes at a cost of financial returns.

[1] Hochberg and Rauh (2013) show that home bias for pension fund PE investments positively correlates with political corruption indices. Andonov et al. (2018) show that increased political representation on pension fund boards is associated with earning lower returns on investments made by the pension fund. Dyck et al. (2020) show that pension funds choose bad PE fund managers because of plan participant outrage at the large fees paid to financial advisors. Andonov et al. (2017) show that public pension funds with more underfunding take on more risky investments to take advantage of regulatory incentives that tie expected returns on investments to liability discount rates.

In this paper, I utilize commercial real estate (CRE) investments as a laboratory to test whether pension fund investments are associated with subsequent employment growth in the zip codes where they invest. Employment is a real economic outcome that public pension funds commonly target.[2] Specifically, I compare direct investments in CRE properties by pension funds to a baseline counterfactual of investments made by real estate private equity (REPE) funds. Using REPE funds is a useful counterfactual for two reasons. First, contracting between Limited Partners (LPs) and General Partners (GPs) results in minimal risk-return incentive distortions. Second, pension funds are major capital contributors to REPE funds[3], so comparing the differential impact on employment of direct investments by pension funds and REPE funds is analogous to comparing investments with additional impact objectives and those without.

Using a difference-in-differences approach, I estimate that public pension fund CRE investments are associated with a 3.5% increase in employment, in the 4 years that follow, relative to investments by REPE funds in zip codes with similar ex-ante characteristics. Additional tests uncover the dynamics: there is a 2% gain in the first year, indicating that roughly 60% of the effect occurs soon after investment.[4]

I also perform cross-sectional tests to understand the heterogeneity of the effect based on the location of the investments and the amount of political influence on the board. Home state investments that can generate additional economic growth are particularly valuable to pension funds since these types of investments are a key focus of their dual mandate.[5] I find

[2] See Appendix A for some examples.

[3] Based on data in Preqin, roughly 30% of all capital committed to REPE funds comes from public pension funds (Preqin (2016))

[4] I focus the analysis on such a disaggregated level because the urban economics literature shows that agglomeration effects manifest most strongly at the zip code level because of firms' proximity to one another (Rosenthal and Strange (2003)). Based on this evidence, I conjecture that zip codes are the ideal level of aggregation to test for employment effects instead of larger aggregations such as MSA or county.

[5] While pension funds can state their dual mandates directly in their investment policy or annual report, pension funds often consider the potential impact of their investments even if they are not explicit about it.

that home state investments result in a 6% increase in zip code employment, relative to REPE CRE investments, and this effect is significantly different from the average effect. In addition, I find that investments in distant states also generate modest subsequent employment growth of 2%, relative to REPE funds, after 4 years. While pension funds may not have direct incentives to invest for growth elsewhere, their consideration of the downstream impacts of their investment choices could permeate their evaluation process for all projects leading them to prefer investments that, all else equal, would be more likely to generate positive benefits.

Political representation on the board will also affect the strength of the incentives to invest for economic growth. Using a triple-difference approach, I show that boards with above median representation of political appointees, in percent, make investments associated with a subsequent employment increase of 4.7%. This effect is 2.8% greater than for boards with below median representation of political appointees. These results, together with the findings about home state investments, indicate that in situtions where motives for impact are strongest larger measurable social impacts do result.

In additional analyses, I show that service sector employment in the treated zip code increases, as opposed to goods-producing sector jobs, and that employment increases at small businesses, classified as those with fewer than 50 employees. The magnitude of the effect is similar for larger businesses, defined as those with more than 50 employees.

Why does employment increase more after public pension fund CRE investments relative to REPE fund investments? I provide evidence for two possible explanations that affect the supply-side of the real estate market. First, since public pension funds are often sophisticated investors their investment in a zip code could act as an informative signal to other investors about the quality of CRE assets located there. I find that roughly $40M in additional capital flows to the zip code in the 4 years that follow pension fund investment, with over two-thirds of the additional capital coming from REPE funds and developers. I perform a similar test at the county level and find no significant effect on subsequent capital flows from other investors. These results imply that the additional ex-post CRE capital flows from other investors are specific to the treated zip codes. Subsequent capital flow from other investors can help to increase the productivity of existing CRE assets in the zip code or can build new supply allowing firms to expand. For example, REPE funds can pursue value-added investment strategies to optimize inefficient properties through renovation or re-tenanting of a property and developers construct entirely new properties. Both activities help to relax constraints on the supply of space.

Second, I utilize property-level cash flow data to understand if pension funds manage their properties differently than REPE funds such that local employment is affected. For instance, the pension funds could undertake investment or leasing programs after purchase with the intent to increase productivity of the building and, ultimately, its market value. Capital investments increase and improve the productive capacity of buildings which directly impacts employment by relaxing space constraints for firms located in the zip code allowing them to hire and grow. Leasing and tenant management activity enables the expansion of existing firms or attracts new firms to the zip code. I compare the cumulative capital expenditures (CAPEX) for properties owned by public pension funds to the cumulative CAPEX of properties owned by REPE funds to test whether pension funds conduct more intensive asset management. I find that pension funds spend, on average, 28% more cumulative CAPEX than REPE funds in the first 4 years of ownership[6]. The difference arises because CAPEX for building improvements and expansions (i.e. increases in leaseable square feet) is significantly higher for pension fund owned properties, but there is no difference in leasing CAPEX between pension fund and REPE fund own properties. This finding is consistent with a supply-side expansion in space available to firms that allows them to hire and grow.

My final analysis examines whether there is evidence for a trade-off between financial returns and social impact. Put another way, if socially positive economic gains from investments factor into the utility function of public pension funds, then the economic impact on employment from the investment offsets the disutility from earning lower financial returns.

[6]The regression controls for property characteristics, such as age, size in square feet, and sale price; year fixed-effects; and property type fixed-effects.

I find suggestive evidence consistent with the hypothesis that there is a trade-off between return and social impact. Considering all CRE investments, those that earn bottom quartile returns are associated with increases in subsequent zip code employment of similar magnitude to investments in higher return quartiles. However, when only considering home-state investments the magnitude of the employment effect is significantly larger among investments that earn bottom quartile returns than CRE investments that earn larger returns. To perform the analysis, I calculate annualized appreciation returns for all round-trip pension fund CRE investments (i.e. returns from the purchase and sale of a property during the sample period). Then, I re-estimate my main difference-in-differences specification to calculate the employment impact within a given return quartile and compare the coefficients across return quartiles for the entire cross-section of pension fund CRE investments and for only those investments made in the home-state.

Prior literature documents the impairment of returns from decision-making frictions, particularly those related to pension fund governance (Hochberg and Rauh (2013), Andonov et al. (2018)). However, prior papers do not estimate the actual social impact that pension fund investments may have and thus cannot rule out its existence and to what extent the social impact may offset the reduced financial returns. The challenge is data-related. First, prior studies use data on investments in private equity *funds* which provide only a rough proxy for the location of where the capital is deployed. This makes attribution of real effects to a specific fund investment difficult.[7] Second, the analysis of pension fund investment in funds masks their dual mandate objectives since GPs retain decision-making control. In other words, capital is no longer invested according to the pension fund's *own* objective function. Third, fund level analysis abstracts from the actions that the investors take to manage their assets and these activities link both the financial performance of the asset as

[7]For example, a General Partner (GP) in the same state as the pension fund will not necessarily allocate capital into that state since their goal is to find the highest NPV projects regardless of location to maximize returns for their LPs and their own compensation. Conversely, a non-local fund could also potentially deploy a large amount of capital in a pension fund's home state, but the capital committed to the fund would be counted as "non-local" based on the definitions used in prior research.

well as any potential real impact downstream.

Studying private CRE investments using a combination of detailed transaction data supplemented with asset-level accounting data addresses these issues. First, the invested capital links directly to a physical location by the nature of real estate being a fixed asset. Second, direct real estate investments are common among institutional investors. This means that observing direct investments, as opposed to fund investments, better captures the unique objectives of pension funds because they retain control over key decisions (e.g. acquisition or disposition) and pension funds have experience making these decisions. Third, direct real estate investment involves active management akin to a majority shareholder of a publicly traded firm having control over firm decisions. Since investing in commercial real estate is not just a simple transfer of ownership, studying differences in asset-level management helps to shed light on how investors can affect real outcomes, such as employment, in the locations where they deploy capital.

This paper relates to the literature on the real effects of private capital investments. Recent research mainly focuses on the downstream impacts of venture capital investments and private equity buyouts. One strand in this literature analyzes the effects of private equity investments on real economic activity at aggregate levels such as country, state, or MSA levels (Samila and Sorenson (2011); Popov and Rosenboom (2013); Popov (2014); Bernstein et al. (2017)). Another strand of literature studies how firm-level productivity changes after an infusion of private capital (Davis et al. (2014); Kerr et al. (2014); Brav et al. (2015); Agrawal and Tambe (2016); Bernstein and Sheen (2016); Faccio and Hsu (2017); Eaton et al. (2019)). I add to this literature by studying the effects of private real estate transactions on real economic activity by using granular zip code level data to isolate local effects. In addition, I provide direct empirical evidence of social impact stemming from pension fund investments whereas prior literature has focused on delegated fund investments. The findings also imply that the retention of decision-making control is key to generating the employment effect.

My analysis also links to the literature on politics and pension fund investment (Hochberg and Rauh (2013); Brown et al. (2015); Bradley et al. (2016); Andonov et al. (2017, 2018)). Previous findings show that pension fund boards with more seats allocated to politicians earn lower returns in their private equity investments. Thise paper shows that pension funds with more politicized boards make investments that generate larger employment impacts. In addition, investments made in a pension fund's home state also have significantly larger impacts. These results combined indicate that public pension funds place weight on generating ancillary economic benefits to balance the objectives of their dual mandate. Moreover, these findings are not only consistent with politically motivated investing, but also with contemporaneous work that highlights that pension funds and their constituents are willing to accept investments that have potential to generate socially positive externalities (Barber et al. (2019); Bauer et al. (2019)). My paper highlights that employment near the investment site is a measurable impact that is strongly associated with real estate investment. This growth may act as a potential "stand-in" for financial returns in the utility function of public pension funds.

More broadly the paper adds to the literature studying the investment patterns of large institutional investors such as pension funds (Rauh (2006); Bergstresser et al. (2006); Rauh (2009); Novy-Marx and Rauh (2012); Andonov et al. (2013), sovereign wealth funds (Lerner et al. (2007); Bernstein et al. (2013)), and endowments (Lerner et al. (2008)). It also ties to the literature on how institutional investors behave with respect to governance and their investments (McCahery et al. (2016)).

1.2 Background and Hypothesis Development

Public pension funds are substantial investors in commercial real estate (CRE) with over \$680Bn in assets as of 2016 which represents nearly 28% of all capital allocated to the real estate asset class (Preqin (2016)).[8] Moreover, real estate is a common component of public

[8]Preqin estimates that, globally, public pension funds account for 15%, by number, of all institutional investment in the asset class, second only to private pension funds at 19%. However, in dollar terms, public pension funds allocate over *2 times more* capital to real estate than private pension funds – roughly \$681Bn

pension fund portfolios with 84% of public pension funds investing in the asset class and a typical allocation of about 10%.

Private real estate investment typically takes one of two forms: delegated investment via real estate private equity (REPE) funds or direct investment where the investor takes an ownership stake in the property. Theory predicts that the main benefit of delegation for the principal (i.e. the limited partner; LP) is that the agent (i.e. the fund managers, or general partner; GP) will exert effort to maximize returns, subject to proper incentives (e.g. Aghion and Tirole (1997)). However, by delegating the LP, such as a public pension fund, gives up significant decision making control and adds a layer of financial intermediation that increases costs (Andonov et al. (2015); Begenau and Siriwardane (2020)). Thus, direct investment provides a way to maintain control over key decisions, invest according to their own preferences, and reduce costs.[9]

Hypothesis 1: Direct CRE investments, where pension funds can invest solely on their own accord, will be more likely to affect employment than delegate investments. I use REPE fund CRE investments as a benchmark for comparison for two main reasons. First, contracting between LPs and GPs ensures that the primary focus of REPE fund investing is to maximize financial returns, which limits the scope for them to invest for other non-financial considerations. Second, since public pension funds are major capital contributors to REPE

globally compared to $340Bn – and their capital allocation accounts for nearly one third (28%) of all capital allocated to the real estate asset class.

[9]Direct investments can be structured as a separate account, a joint venture, or simply independently investing in the asset directly. There is ample evidence that investors value this additional control. Data from Preqin on the real estate investment preferences of public pension funds in my sample shows that 87% have a stated preference for separate accounts, joint ventures, or directly investing in property. Further evidence, sampled directly from pension fund annual reports and investment policies, indicates the primary value is control related to key decisions relating to acquisition, liquidation, or operations as well as fee reductions. For example, the Washington State Investment Board (WSIB) states in its investment policies that, for real estate, it prefers to invest in partnerships without co-investment from other financial entities. In particular, "to provide the WSIB with control related to liquidation, acquisition, and operational decisions, such as capital expenditures." The investment policies are summarized in the WSIB's CAFR for 2019 located here. Additional evidence comes from Preqin Investor Profiles specifically for public pension fund real estate portfolios. For instance, the Arizona State Retirement System "views separate accounts as a highly attractive investment opportunity, due to the low fees and increased investor discretion associated with the vehicle."

funds, the setup implicitly contrasts investments made directly by public pension funds with their own indirect investments. Thus, comparing the incremental effects on employment between the two simulates an ideal experiment, as closely as possible, where the pension fund invests with and without considering its dual mandate objectives.

Prior studies show that public pension funds operate in a "political sphere". Public pension fund governance consists of a board of trustees that oversees investment decisions. The boards are populated with *ex-officio* politicians, trustees appointed by politicians or local governments, and elected pension participants leading to political influences on the board (DiSalvo (2018); Anzia and Moe (2019)). The literature shows that this leads to poor financial performance of their private equity fund investments and can be attributed to: private benefit extraction, local tilts, or local growth incentives (Hochberg and Rauh (2013); Andonov et al. (2018)); increased risk taking (Andonov et al. (2017)); or poor manager selection (Dyck et al. (2020)). Most prior studies focus on the returns earned by public pension funds on their capital deployed in private investment funds for private equity, venture capital, and real estate.[10]

Few papers study the *actual* impacts generated by the private investments of public pension funds. A handful of studies have begun to develop our understanding of the effects of private equity and venture capital *fund* investments on real economic variables such as employment and firm-level operations. However, direct evidence of the real impact of private real estate investment is scarce. This paper develops our understanding by analyzing how CRE investment by public pension funds affects employment near the investment site (i.e. zip code) employment.

Hypothesis 2: The size of the estimated employment effect will depend on the strength of the incentives to invest for impact. Investments located in the same state as the pension fund (i.e. home state investments) are particularly targeted by pension funds' dual mandates

[10]Papers by Brown et al. (2015) and Bradley et al. (2016) study the public equity investments of public pension funds and find contrasting evidence for whether or not political influences lead to higher returns for stock investments.

(See Appendix A for a sampling of direct quotes). I test whether these investments deliver larger impact than investments located outside the home state. Based on the existing literature, political representation on the board alters the investment decision-making process. I also test whether the employment impact varies with the degree of political representation on the board of trustees.

Why does employment change after public pension fund CRE investment? Firm employment plausibly links to CRE investment because commercial real estate provides the location where productive inputs, labor and capital, combine to produce output. Most firms lease their space from property owners instead of owning property outright. Prior studies show that real estate ownership by firms can negatively affect their ability to grow and high-growth firms suffer the most (Bergeaud and Ray (2017)). Moreover, firms, especially small ones, face binding financial constraints since they cannot easily access financial capital to expand. Thus, investments in real estate are critical in providing the local space market with sufficient capacity for firms to grow.[11]

Hypothesis 3: Pension funds affect employment in the zip codes where they invest because their investments attract follow-on capital and they manage their own investments differently than REPE funds. Investments by public pension funds may not fully release the local space constraints on their own, but their investment acts as a signal about the potential of the zip code for *other* investors. This information attracts capital from other investors that further improves the efficiency and productive capacity of local real estate allowing firms to grow and increase employment. I test whether additional, non-public pension fund CRE capital flows to the treated zip codes after a pension fund invests.[12] In addition, the properties pension funds buy could undergo significant capital improvement

[11] The small business sector in America occupies 30% to 50% of all commercial space — an estimated 20 billion to 34 billion square feet (Source: U.S. Small Business Administration, "Small Business Trends: Small Business, Big Impact").

[12] Moreover, the impact of this signal should be local and only affect the treated zip code and not the overall county in which the building is located. I test this corollary by re-estimating the same specification at this higher level of aggregation to determine whether the county-level investment by other investors changes as well.

or aggressive leasing programs to increase the productivity of the building and decrease vacancy, respectfully.[13] I test whether, on average, pension funds spend more on capital expenditures on their properties relative to REPE funds and whether that CAPEX is in the form of building CAPEX or leasing CAPEX to uncover differences in asset-management associated with public pension fund and REPE fund ownership.

1.3 Data

1.3.1 Pension Fund CRE Transactions

My analysis relies on a unique dataset of US commercial real estate (CRE) investments from Real Capital Analytics (RCA) that covers all US CRE investments greater than $2.5M between 2001 and 2018. The data includes information about the transaction (e.g. price, transaction date, property type, capitalization rate, and property location information) and the assets (e.g. square footage, year built, and estimated occupancy). RCA compiles the data using a proprietary research process. RCA uses at least two independent data sources to verify each investment and augments the verification with additional research by RCA analysts as well as feedback from active CRE brokers and investors. The investments of interest are direct CRE investments by US public pension funds. Direct CRE investments list a pension fund, by name, as one of the buyers of record. In contrast, deployment of pension fund capital via real estate private equity (REPE) funds, where the pension fund is a passive investor, will list only the REPE fund(s) involved as the buyer(s). Each investment has information on up to four buyers and sellers. RCA invests substantial resources to identify the ultimate owner(s) involved in each transaction and uses standardized names across their database that helps simplify the search for public pension fund buyers.

To help identify public pensions by name, I use data from the Public Plans Database

[13] This investment to increase and improve the productive capacity of the buildings has a direct impact on employment because it relaxes the local, zip code level space constraints on firms and spurs hiring by either: (a) improving the productivity of existing assets that are not optimized for their tenants or (b) decreasing the vacancy at underutilized properties.

(PPD) housed at Center for Retirement Research (CRR) at Boston College. The CRR collects information from the Comprehensive Annual Financial Reports (CAFRs) published by public pensions and makes them into a usable dataset for researchers. The PPD data covers the period from 2001 to 2017 for virtually all public state and local pension plans in the US.

Matching plan names from the PPD data to the RCA data identifies 39 state and local pension funds from 26 states that invest in CRE with a direct ownership claim. The geographic distribution of pension plans shown in Figure 1.1 indicates roughly even geographic coverage of public pension plans.[14] The baseline sample consists of 1,703 direct CRE investments by public pension funds. The aggregate investment value is roughly $93 billion, or $5.5 billion per year. Pension funds are the sole buyer in 20% of the transactions; 59% of the transactions are a joint-venture (JV) with a single partner; 18% are JVs with two partners, and only 2% of the transactions involve 3 partners along with the pension fund.

The property location data helps to generate additional indicators that equal one if the investments occur in the pension fund's home state, an adjacent state, or a distant state.[15] Home state investments account for 19% of the transactions (by number) while adjacent state and distant state transactions represent 5% and 76% of the transactions, respectively. I also construct a set of exhaustive indicators for each property type represented in the data: apartment, office, industrial, retail, development site, and hotel.

[14] I match the names of state pension funds from the PPD to the buyer names found in the transaction data by searching for the pension fund's name across all four listed buyer fields in the RCA data. The name search yields 1,715 observations. Filtering for investments with non-missing zip code information results in 1,703 remaining observations.

[15] The home state indicator equals one if the investment occurs in the same state as the pension fund's headquarters and equals zero otherwise. The adjacent state indicator equals one for any investments made in any state that shares a physical border with the pension fund's home state and equals zero otherwise. Any investment in a state that does not match the above conditions is a distant state and the distant state indicator equals one and is zero otherwise.

1.3.2 Zip Code Outcomes

The focus of this paper is to understand the real economic impact of CRE investment on employment. To do this, requires geographically granular data. I collect zip code employment and business data from the US Census Bureau's County Business Patterns (CBP) data series. The CBP contains annual zip code data on employment, business establishments, and aggregate income from 1994 to 2017.[16] The main dependent variable studied is the natural logarithm of employment in a zip code each year, $ln(Emp)$. A portion of the CBP data focuses on business establishments and contains NAICS industry classification codes, up to 6-digits, for all firms in each zip code. The NAICS codes help to disaggregate total employment into jobs associated with either service-providing or goods-producing industry supersectors.[17] Furthermore, the data enables calculation of a proxy for employment among firms of varying labor force size.[18]

In addition to employment, I study the natural logarithm of business establishments and disaggregate businesses into those with fewer than 50 employees, denoted as small businesses, and firms with at least 50 employees, denoted as large businesses. An additional dependent variable, the average wage per worker in a given zip code, comes from the division of the total annual payroll by total employment.[19] Also, the annual growth rates of employment

[16] The CBP is reported with roughly a two-year lag, so even though the CRE transactions dataset goes to the end of 2018, the timeframe for my analysis is limited by the end-date of the CBP. Moreover, changes on how the data is reported by the US Census resulted in the 2018 release being severely redacted with many observations being set to missing, resulting in a nearly useless zip code level dataset.

[17] Supersectors are defined using the classification provided on the Bureau of Labor Statistics' (BLS) website. The NAICS classifications for service-providing and goods-producing industry supersectors can be found here and here, respectively. Similarly, I use BLS industry classifications to isolate high-skill industries, which they define as those industries with 2.5x the national average of STEM (Science, Technology, Engineering, and Mathematics) occupations.

[18] The establishment data classifies establishments in each zip code by number of employees using several bins ranging from 1-4 employees to greater than 1000 employees. I code the midpoints of each bin as the number of employees per establishment within the bin and then multiply that value by the number of establishments in that bin to obtain a proxy for the zip code's employment level by firm size. A similar procedure proxies for employment within each NAICS supersector.

[19] The natural logarithm of this value is used in the regression analysis.

and businesses provide time-varying zip code controls for the regression analyses.

1.3.3 Additional Data Sources

Asset-level Information: I also use data from the National Council of Real Estate Investment Fiduciaries (NCREIF), which contains asset-level accounting data on CRE properties. The database contains self-reported data from NCREIF members (e.g. investment managers or corporations) that own real estate with a total market value of at least $50M held in a fiduciary, tax-exempt setting. As a condition of membership, each member must contribute data on their entire portfolio of publicly and privately held institutional CRE investments for inclusion in the NCREIF property database. The data is reported on a quarterly basis and the NCREIF sample contains data on 36,236 properties from 1978Q1 to 2017Q2 (roughly 686,000 property-quarter observations).

I combine fuzzy-matching followed by a hand-verification procedure to link the RCA and NCREIF datasets to enable comparison of asset management strategies between public pension funds and REPE funds.[20] The resulting crosswalk contains 504 matched properties. This corresponds to a roughly 31% match rate (504 out of 1640 total properties over the 1703 investments by pension funds).

The match rate is relatively low for two reasons. First, only 27 of the 39 pension funds with investments in the RCA data have corresponding asset-level information in the NCREIF

[20]While this procedure may seem ad-hoc and tedious, no universal property identifier exists to link across CRE databases. Careful manual matching is essentially the only way to proceed when trying to combine CRE data sources. To create a crosswalk dataset, I simplify the RCA investments data to only key pieces of information: the RCA property ID, the property type, address, zip code, state, latitude, longitude, and the status date (i.e. date of the transaction). A year-quarter variable generated from the status date represents when the transaction took place and matches the format of the acquisition quarter field in the NCREIF data. Next, the 1703 RCA transactions are fuzzy-matched to the NCREIF dataset using a simplified version of the NCREIF database that contains the same fields as the simplified RCA database. This simplifies the comparison between property and location information by using relying on the zip code of the property and the transaction quarter (RCA) / acquisition quarter (NCREIF) as a first-pass. This generates a dataset with 1977 observations. Third, by hand, I create a unique mapping between the RCA transactions and the NCREIF properties. Address or lat/long coordinate searches on Google and Bing Maps locate each of the buildings determine whether the matches correspond to the same property. Some properties have multiple entrances and RCA or NCREIF may use different addresses that correspond to the same building.

data. It is likely that the missing pension funds are not NCREIF members. Second, the match rate suffers because there are no matches between the two databases for the initial fuzzy-match procedure or because the self-reported NCREIF address data is prone to data-entry errors. For example, 123 15th Street may be input as 1231 5th Street. RCA processes their address data to verify its accuracy and to report it with a uniform structure, so I take the RCA addresses as correct. If the data entry errors cannot be easily reverse-engineered or there is a clear mismatch, then the hand-verification step removes these potential candidate matches from the sample.

Pension Fund Governance: Data on pension fund board governance comes from the website of the National Association of State Retirement Administrators (NASRA). For each state in the United States, the NASRA website provides information on board composition of the state, county, and city pension funds headquartered in the state. The board composition information includes the board size, the number of members that are appointed, the number of board members that are elected, and the number of board members that are *ex-officio*. For each pension fund, I calculate the percent of each board that is appointed, elected, and *ex-officio*, respectively, and indicator variables equal to one for whether the fund's percentage in each group is above the cross-sectional median.

1.3.4 Summary Statistics

Table 1.1 describes the real estate investments and the pension funds data. Panel A summarizes the direct CRE investments by pension funds using the RCA data. On average, a public pension fund in my sample invests \$55M dollars though there is substantial heterogeneity (Std Dev = \$140M) and the distribution is skewed right due to some large transactions of over \$1Bn. On average, 15% of direct investments take place in the central business districts of cities, 19% are in the pension fund's home state, 5% are in immediately adjacent states, and 76% take place in distant states. The investments are concentrated among the four main types of CRE: apartment (17%), office (21%), retail (20%), and industrial (36%). Hotels and development sites are 2% and 3% of the transactions, respectively.

Panels B, C, and D describe the characteristics, asset allocations, and reported returns of the pension funds in the sample using the PPD data. There are 39 pension funds reporting for 17 years resulting in up to 663 pension-year observations. The annual reports that underlie the PPD data lack standardization and this creates some missing information because of inconsistent reporting either across or even within pension funds. On average, the 39 plans have \$40Bn in assets and \$49Bn in liabilities. They comprise 56% of all pension fund assets, 54% of all pension fund liabilities, and 68% of all real estate assets over the sample period.[21]

Public pension funds invest the bulk of their assets in pubic equities and fixed income securities, however real estate, private equity, and hedge fund investments combined represent roughly one quarter of invested assets. The sample pension funds have broadly similar asset allocations compared to pension funds that are not in my sample, but have slightly lower allocations to fixed income (-1.4%, $p < 0.01$) and hedge funds (-3.1%, $p < 0.01$) and a slightly larger tilt towards real estate (+1.5%, $p < 0.01$).[22] Even with slight differences in their portfolio allocations, the portfolio-level returns for the pension funds in my sample do not differ by a large margin. Real estate and private equity earn the largest annual returns over the sample period. Overall, the plan-level returns by asset class are similar for pension funds in my sample compared to those that are not, except that sample pension funds earn slightly better returns in private equity (+1.6%, $p < 0.01$).[23]

1.4 Empirical Methodology

I use a difference-in-differences approach to compare the change in employment experienced in zip codes that receive pension fund CRE investment (treated zip codes) relative to the change in employment experienced by zip codes that receive investment from real estate

[21] The figures result from taking the cross-sectional average in each year from 2001 to 2017 and then taking the time-series average across years and are shown in Appendix Table B.1.

[22] Appendix Table B.2 shows the details of the asset allocation comparisons.

[23] Appendix Table B.3 shows the details of the portfolio returns comparisons.

private equity funds (control zip codes). The main regression specification used in my analysis is:

$$y_{z,c,v,t} = \alpha_z + \gamma_{v,t} + \beta_1(Treated \times Post)_{z,c,v,t} + \theta X_{z,c,t-1} + \varepsilon_{z,c,t} \quad (1)$$

Where the index z represents zip codes, c represents counties, v represents vintage, and t represents years. The main dependent variable, $y_{z,c,v,t}$, is the natural logarithm of employment, $ln(Emp)$. *Treated* is an indicator for a treated zip code that is equal to one if the zip code is one that receives investment from a public pension fund and is equal to zero if it receives investment from a REPE fund. *Post* is an indicator equal to zero for all years before investment, in event-time, and equals one for all subsequent years. The coefficient of interest is β_1 that estimates the effect of the interaction $(Treated \times Post)_{z,c,v,t}$. The control group of zip codes are zip codes invested in by real estate private equity (REPE) funds that are in the same state as a given treated zip code. Thus, β_1 measures the change in $ln(Emp)$ in zip codes that received pension fund CRE investment relative to the change in $ln(Emp)$ of zip codes, in the same state, that received investment from a REPE fund.

To help identify the parameter estimates, I include 1-year lagged zip code and county controls $X_{z,c,t-1}$. The controls include 1-year lagged zip code employment growth, business establishment growth, county GDP growth, county population growth, county employment growth, and county income growth. These controls account for time-varying factors that could affect employment outcomes. The main specification also includes zip code fixed effects, α_z, to control for time-invariant, omitted variables that differ between zip codes and vintage-by-year fixed effects, $\gamma_{v,t}$, to control for unobserved common factors that affect all zip codes invested in the same year over time. Standard errors are clustered at the county level (Bertrand et al. (2004); Petersen (2009); Cameron and Miller (2015)). This clustering assumes correlation in the errors across zip codes in the same county, but independence in the errors for zip codes in different counties.

1.4.1 Matched Sample Construction

To construct the matched sample, I first filter the baseline sample of 1,703 direct pension fund CRE investments to include only those from 2017 or earlier since the Census CBP data are only available through 2017 while he RCA data covers up to 2018. This results in a slightly smaller sample of 1,659 investments. The pool of control zip codes contains zip codes that have investment from REPE funds during the sample period but are not in the treated group of zip codes. This results in a pool of 4158 candidate control zip codes.

I match each treated zip code one-to-one with a control zip code using propensity score matching, with replacement, and require common support for both treated and control observations. The matching procedure uses the following characteristics: $ln(Emp)_{z,t-2}$ and $ln(Emp)_{z,t-1}$ to ensure the zip codes have similar employment levels and employment growth prior to treatment; the $t-1$ year to ensure zip codes are invested in during the same year; the state where the zip code is located; and the county-level capitalization rate.[24] The matching procedure results in 1,323 matches for 2,646 observations that results in a panel of about 45,000 total zip-year observations from 2001 to 2017.

Table 1.2 summarizes the characteristics of the treated and control zip codes.[25] The left panel shows summary statistics for the unmatched sample of zip codes, measured as of one year before investment. Unconditionally, the control zip codes have fewer business establishments ($ln(Est)_z, t$), more business growth ($\Delta(Emp)_{z,c,t,t-1}$), and are located in counties that receive over \$1 billion more CRE investment than treated zip codes. The right panel shows summary statistics for the matched sample, measured as of one year before any investments take place in event-time. After matching, there are no significant differences between the

[24] I calculate the county-level capitalization rate – cap rate, for short – using the entire sample of CRE transactions. Cap rates are derived by dividing the 1-year ahead property-level net operating income by the market price of the property (i.e. an *inverse* price/earnings ratio). This provides a direct measure of expected current yield of the property. Thus, cap rates embed investor opportunity cost of capital, growth expectations, and risk expectations and provide a measure of expected returns.

[25] Recall, the treated zip codes are those where a pension fund made a direct CRE transaction and the control zip codes are those in the same state where a REPE fund invested in CRE.

characteristics of the treated and control zip codes indicating that the matching procedure achieved good balance across observable dimensions.

1.4.2 Identification

When pension funds invest directly in commercial real estate (CRE), they can invest according to their own preferences. Dual mandates and political influences alter the investment decision-making process to favor investments that allow them to internalize both the financial returns earned and the subsequent economic growth generated. In contrast, real estate private equity (REPE) fund investments deploy capital strictly to maximize financial returns. Public pension funds also make delegated CRE investments using REPE funds and contribute roughly one-third of all capital committed to REPE funds. Thus, comparing pension fund direct CRE investments to REPE fund CRE investments implicitly compares when a pension fund takes their incentives to invest for economic impact into account and when they ignore these incentives to maximize solely financial gains by delegating control to fund managers. This makes REPE funds an ideal control group to help understand whether the difference in objectives ultimately leads to different real outcomes.

The main assumption for internal validity of the difference-in-differences estimator is that the change in employment would have been similar for both the treatment and control zip codes whether a pension fund invested or not (i.e. the parallel trend assumption). I illustrate parallel trends for the main dependent variable in this study, $ln(Emp)$, in Figure 1.2 which shows the average value of $ln(Emp)$ for the 4 years before and after. Visually, there is a lack of differential trends prior to the investment period for the treated and control group zip codes and this is confirmed by a leads-lags regression whose coefficients are shown, with 95% confidence intervals, in the right panel of the figure.[26] The average value of $ln(Emp)$ for treated zip codes increases and remains elevated for the 4 years after pension

[26] The leads-lags regression has the exact same setup as Equation 1.4, including controls, fixed effects, and standard error clustering structure. I repeat the graphical and leads-lags regression analyses for all dependent variables used in my study. The graphs are shown in Figures 1.3 to 1.10.

fund investment while average $ln(Emp)$ in the control zip codes remains flat. The leads-lags model shows there are no significant differences before investment occurs, but there are significant differences afterward. Furthermore, the leads-lags regressions indicate the timing of the change of employment in the treated zip codes is concentrated around the investment period and then the difference continues to evolve over time.

1.5 Results

The analysis below contains three sets of results. The first examines whether direct CRE investments by public pension funds affect subsequent zip code employment differently than CRE investments made by REPE funds. The second set of results provides evidence for two potential mechanisms that drive the divergence in subsequent employment growth. The third analysis describes the realized returns public pension funds earn on their direct property investments and evaluates whether social impact from economic growth comes at a cost of financial returns. In other words, is there an observable negative correlation between financial return and social impact?

1.5.1 Employment Effects

In this section, I present evidence that direct CRE investments by public pension funds have a larger causal impact on zip code employment than investments by REPE funds. Both public pension funds and REPE funds invest to earn financial returns, however, only public pension funds should internalize the economic spillovers their investments generate because of their affinity for these kinds of investments. Given this behavior, their investments should have a measurable impact. However, if investments made according to dual mandate objectives are inefficient at generating economic growth or the objective itself is simply virtue signaling then there should be no measurable difference.

To assess the difference, I estimate the regression model described in Equation 1.4 on my matched sample of zip codes over the period from 2001 to 2017. Under the identification assumptions, the estimates measure the difference in how employment in a zip code changes after a pension fund invests in CRE relative to how employment changes after a REPE fund invests. Table 1.3 presents the results. Column 1 reports estimates obtained using all observations, without any controls or fixed-effects, and shows a positive and significant effect of 9.4%. Columns 2 and 3 add in vintage-by-year fixed effects along with zip and county controls, and then zip code fixed effects, respectively. The estimated coefficient decreases to 8.4% and then 5.5% as observed and unobserved heterogeneity is controlled for. The estimates in columns 4 to 6 show the dynamics of the effect. In each column, the estimation window is restricted to only include observations that are within one, two, or four years before and after treatment, respectively. The positive effect on employment grows over time from 2% to 3.5% and graphical evidence shown in the rightmost graph in Figure 1.2 illustrates that the timing of the effect is centered around the time of investment. The estimate in column 6 shows the first main result, that direct CRE investments by public pension funds are associated with a 3.5% larger increase in zip code employment than CRE investments by REPE funds in similar zip codes over the four years after investment. In addition to changes in average total employment, I study the differential impact of pension fund CRE investments on business growth. Untabulated results show that CRE investments by public pension funds are associated with a 2.0% larger increase in the number of firms in the zip codes where they invest relative to similar zip codes where REPE funds invest. Half of the effect occurs in the first two years, similar to the dynamics for employment growth. The more muted differential growth is consistent with labor being a flexible input to production in contrast to firm creation or relocation. Does the increase in employment alter the size of firms in the zip codes? To test this hypothesis, I estimate the differential change in the number of employees per firm in the zip code. While the coefficient is positive, it is not statistically significant at standard levels.

Next, I investigate what types of employment are most affected by pension fund CRE investments.[27] The analysis focuses on how CRE investments affect employment in the service-providing or goods-producing supersector groups since CRE investments can directly affect employment in both supersectors. For example, investments in retail or office properties affect jobs in the service-sector located in and around the building. Similarly, industrial property investments or developments can affect employment in the construction and manufacturing industries.[28] Table 1.4 presents the results in columns 1 and 2. Employment in service-providing industries increases by 3.5% more in treated zip codes relative to control zip codes. However, there is no significant effect for employment in goods-producing industries. The service-providing industries that drive the difference are: professional services, information, retail, and wholesale trade. Some of these industries contain high-skill workers which command higher wages. Thus, the increase in employment could also affect wages. Untabulated results indicate that aggregate annual payrolls rise by 3.9% more in the treated zip codes relative to control zip codes. However, this increase in payrolls does not correspond to a differential increase to the average wage per worker.

Lastly, I explore how CRE investments affect employment at small and large firms where size is measured by the total number of employees.[29] Columns 3 and 4 in Table 1.4 show that zip codes with direct CRE investment by pension funds experience more growth of both small and large business employment than in zip codes where REPE funds invest.

[27] I break down the employment data based on whether employment takes place in a service-providing or goods-producing industry based on 2-digit NAICS codes using business establishment data from the US Census. The data disaggregates the number of business establishments in the zip code categorized by the number of workers they employ. The categories are 1 to 4, 5 to 9, 10 to 19, 20 to 49, 50 to 99, 100 to 249, 250 to 499, 500 to 999, and 1000 or more. I calculate the number of employees as the midpoint number of workers in the category multiplied by the number of establishments in that category. I then sum up all employment in the service-providing and goods-producing 2-digit NAICS supersectors and take the natural logarithm of the sum. Classification for the service-providing and goods-producing 2-digit NAICS supersectors are based on the US Bureau of Labor Statistics' categorization replicated in Appendix Table B.4).

[28] For instance, industrial properties are often purpose-built properties designed to suit specific needs such as shipping distribution, warehousing for various goods, manufacturing, or data centers.

[29] Small firms are defined as those with less than 50 employees. Large firms are those with 50 or more employees. Using the US Census CBP business establishment data, I sum employment for all firms with fewer than 50 employees and firms with at least 50 employees and then take the natural logarithm to construct the dependent variables. The aggregation of workers includes all NAICS industries.

The evidence in this section shows that, on average, zip codes where pension funds invest do experience larger real economic gains than zip codes where REPE funds invest. While the employment gains remain within the service sector, growth for both small and large businesses drives the employment gains. Overall, the results support the hypothesis that public pension funds consider different objectives when making investment choices. By investing directly, they retain control of their investments and afford themselves the opportunity to pick investments according to non-financial criteria. The estimates show that their choices do result in a greater incremental impact than investors solely focused on maximizing financial returns.

1.5.2 Home-state Investments and Political Incentives

In this section, I test whether the strength of the social impact is associated with the motives for investing for non-pecuniary reasons. Prior literature has shown that pension funds can have a home bias that tilts their investments to have a disproportionate amount of investments located in their home state which can affect investment returns (Hochberg and Rauh (2013); Brown et al. (2015); Bradley et al. (2016)). Yet, it is not well understood whether home state investments generate additional economic growth. Investment policy documents of public pension funds hint at a different objective function for home state investments and a desire to drive economic growth via their investments. For example, pension funds from Alabama, California, Iowa, and New York, among others, state explicitly in their investment policies that they make investments in their home states to help local economic growth. Combining previous results and this anecdotal evidence leads to a natural hypothesis that employment spillovers should be larger if the investment takes place in their home state because political influences and/or willingness to invest for impact should be the strongest.

I test for a differential effect by using the same model on subsamples of CRE investments. Table 1.5 shows that home state investments exhibit larger employment spillovers than more distant investments. Column 1 shows the main result for reference. Column 2 estimates the model on a subsample of investments that only took place in the home state of the pension fund.[30] Column 2 shows that home state investments by pension funds lead to a 6.5% larger increase in zip code employment within 4 years than REPE fund investments. Pension fund investments in adjacent states (column 3) have a statistically insignificant (but directionally positive) effect. Investments in distant states (Column 4) are associated with a 2.8% larger increase in zip code employment. I compare the home-state employment effect vs. that of distant state investments using a triple-difference model estimated using a four-year window before and after treatment. The estimated triple-interaction tests if the difference between the two effects is zero. I reject the null hypothesis: the difference of 3.5% between the estimated impact of home and distant state investments is statistically significant ($p < 0.10$). In short, the results show that the average effect of CRE investments on employment is larger where dual mandate incentives are the strongest.

In addition to home bias, public pension funds operate within a politicized governance environment (DiSalvo (2018); Anzia and Moe (2019)). Earlier research indicates that this affects the investment decision making process of the board of trustees (Lerner et al. (2007); Hochberg and Rauh (2013); Andonov et al. (2018); Dyck et al. (2020)) and can lead to earning lower returns on their investments. I hypothesize that these same political incentives are also correlated with the size of the real impact on zip code level employment. If the downstream impacts of a pension fund's investments are particularly relevant for politically affiliated members of the board (e.g. political appointees and *ex-officio* members), then investments made by boards with more political representation on the board should result in a larger impact than those made by boards with less political representation. Conversely, if political considerations are nothing more than posturing that does not alter investment objectives to additionally consider social impact then there should be no effect. I test whether the the proportion of each of these groups on the board is related to the size of subsequent employment gains by comparing the effect for investments made by boards with above or

[30] Recall that the treated zip codes and the control zip codes are required to be in the same state and only differ in the type of investor who is the buyer, either a US public pension fund or a REPE fund.

below median representation of each group.[31]

Table 1.6 shows the results. Columns 1 to 3 show the results for investments made by boards with below and above median representation of political appointees on the board. Boards with a lower percentage of politically appointed members make investments associated with a 2.1% increase in employment while investments made by boards with above median representation result in a subsequent 5% increase in zip code employment. The difference is statistically significant. Columns 4 to 6 study variation in the zip code employment effect for boards with above and below median representation of *ex-officio* members. The effects are essentially the same for both groups (3.5%, $p < 0.05$). Columns 7 to 9 repeat the analysis for boards with above and below median representation of elected pension plan members. The estimates mirror the results for in columns 1 to 3.[32] This is expected since the percentages need to add up to 1 and boards with a large proportion of appointed members will have a relatively small proportion of elected members.

In summary, incentives to invest for impact will be strongest when the investments are located in the pension fund's home state or if the pension fund's board has significant representation of political appointees. Some new subtleties of the political channel arise from the results. While both appointed members and *ex-officio* members are politically linked, the primary decision-making pivot that drives investment decisions towards those with higher subsequent growth effects is the percentage of appointed members on the board. The impact results here fill in a gap in the literature by providing an assessment of the "opposite side of the coin". While home bias or more political boards have been shown to invest in ways that lower returns, this paper shows evidence that the investments they choose can also generate socially positive benefits.

[31] I calculate the percent of the board that is appointed and *ex-officio*, calculate the sample median percentages and then run cross-sectional tests of the effect of political representation on the board on employment.

[32] There is less variation in the percentage of board seats occupied by *ex-officio* members than there is to the number of board seats occupied by appointed or elected members, by roughly a factor of two.

1.6 Underlying Channels

In this section, I study the potential mechanisms that drive the increased zip code employment effect observed for CRE investments by public pension funds relative to REPE funds. The empirical evidence so far indicates that the investments are associated with a 3.5% larger increase in zip code employment after 4 years, relative to REPE fund investments. How does this growth get generated?

The analysis explores two potential mechanisms to understand this phenomenon. First, I study the impact of pension fund capital on subsequent capital flows into the zip code from other investors. There is substantial heterogeneity across commercial real estate markets. As a result, investors are not all equally informed about individual markets. One way to gather information about the market is to observe the investments by large, institutional investors such as public pension funds. I test whether pension fund investments act as a signal for other investors to invest. Second, I study whether pension fund-owned properties are managed differently than REPE fund owned properties. Successful real estate investment requires hands-on asset management. Using property cash flow data, I test whether pension funds spend more on cumulative capital expenditures over the first 4 years of ownership relative to REPE funds. Additional tests assess which types of CAPEX differ between the two investors: capital investments in the building or capital investments to decrease vacancy by paying lease commissions.

1.6.1 Signaling and Capital Flows of Other Investors

Pension funds are large investors that often invest with sophisticated strategies and they deploy significant amounts of capital to real estate each year. Accordingly, other investors will observe their actions in the market. On one hand, pension fund investment may be a signal that there are institutional quality assets in the zip code because they are confident to invest and so other investors follow their lead. This predicts positive subsequent capital flow from other investors. Conversely, it may also be that pension funds may be late to the game and their investment signals a crowded CRE trade. This would negatively predict future flows from other investors. This is similar to Bikhchandani et al. (1992) where investors infer private information – in this case, the quality of CRE in the zip code – from the prior trades of better-informed managers and trade in the same direction. This type of behavior is also referred to as “cascading" in the mutual fund literature (Wermers (1999)). Moreover, this economic mechanism is agnostic of where the capital is deployed relative to the pension fund’s home state since the revealed information - whether there is institutional quality commercial real estate - is relevant irrespective of geography. Thus, this effect speaks more broadly to how (very) local capital flows in commercial real estate are influenced by trade activity of large investors.

Subsequent capital flows from other investors can help to increase employment in two ways: additional investment raises the productivity of existing real estate assets in the zip code by re-optimizing them and construction of new buildings increases the supply of space. Both activities shift the supply curve to the right. Two major types of investors that can have this kind of impact are REPE funds and Developers. REPE funds can pursue value-added and opportunistic CRE investment strategies.[33] Value-added investments target properties that are not being used to their full potential and typically need mild renovation or re-leasing to attract better or larger tenants. Opportunistic investments acquire distressed properties, usually at a discount, and then reposition them which requires significant investment to accomplish. Both strategies positively impact the supply of space by making existing CRE assets more productive inputs for firms, indirectly increasing the supply of space.[34] Development of new properties directly adds to the supply of space in the zip code. Increased supply of space puts downward pressure on rental rates. As rental rates fall, existing firms

[33]REPE funds can also invest in Core strategies. This is the least risky strategy since it involves investing in properties that are already performing optimally (e.g. fully leased and no major renovation needed). These types of properties are mainly cash flow investments.

[34]The indirect increase in supply comes from taking a building that is making suboptimal use of its space because of poor management or because of a bad tenant mix and making the necessary changes to maximize the property’s use.

in the zip code are more willing to use real estate as an input to production and expand while lower rents and (re-)leasing activity attracts new firms to the zip code.

I test the above hypotheses using a difference-in-differences regression using the dollar volume invested in the zip code by other investors as the dependent variable.[35] An additional test examines whether pension fund CRE investment affects capital flows more broadly for the county where the property is located to understand the geographical extent of the signal (i.e does it aggregate to the county-level?). For instance, if the information is location specific, then one would expect there to be statistically significant effects at the zip code level and not at the county level.

Table 1.7 shows the estimates. I find significant evidence of other investors following pension funds at the zip code level, but there is no significant effect at the county level. In column 1, investment by other investors increases by roughly $40M more in zip codes where pension funds invest in CRE relative to zip codes where REPE funds invest in CRE. Columns 2 and 3 show that real estate private equity funds and real estate developers make up two-thirds of this additional capital flow. In contrast, the county-level analysis shows positive, but insignificant effects which is consistent with the notion that the information conveyed is highly local to the CRE investment itself (i.e. the same zip code).

1.6.2 Property-level Management

In contrast to ownership of financial assets, ownership of commercial real estate requires management. As a result, both the financial performance of the property and the economic growth of the area immediately surrounding link to how effectively a property is managed. Management includes tasks such as managing tenants and investing in the property via capital expenditures to improve the productivity of the building via improvements or expansion

[35] The setup is the similar to the main regressions, but with a dollar volume of investments by other investors as the dependent variable. Other investors are defined as all investors, excluding US public pension funds.

of leaseable space.[36]

Capital expenditures on leasing and tenant improvements occur as leases turn-over. Property owners hire lease brokers to search for and secure tenants and brokers are paid commissions for this service. Tenant improvements are cash allowances that property owners allocate to the cost of (re)constructing space for tenant occupancy. Building improvements and expansions are more capital intense. Building improvements are investments to improve the common areas of the property (e.g. lobby) or critical systems (e.g. elevators, HVAC). Building expansion investments result directly in the expansion of a property's leasable square footage.

I leverage quarterly asset-level accounting data to understand whether management intensity differs between properties owned by pension funds and properties owned by REPE funds. The first analysis estimates the difference in cumulative CAPEX and the second analysis studies differences in the two main components of cumulative CAPEX: building CAPEX and leasing CAPEX.[37] I estimate OLS regressions using the specification below:

$$ln(Cumul.CAPEX)_{i,p,t} = \beta_0 + \beta_1 \mathbb{1}(PFProp)_{i,p} + \beta_2 X_{i,t} + \lambda_t + \theta_p + \varepsilon_{i,t} \qquad (2)$$

where the index i represents a property, p represents property type (e.g. office), and t represents a year-quarter (YYYYQ). The indicator $\mathbb{1}(PFProp)_i$ equals 1 if the property is owned by a public pension fund and is 0 otherwise. The coefficient of interest, β_1, measures the difference in cumulative CAPEX between pension fund and REPE fund owned properties. The controls, $X_{i,t}$, contain property characteristics: the size of the property, $ln(SqFt)$; the purchase price of the property, $ln(Purch.Price)$; and the age of the property at acquisition, $AgeatPurch$. The regression includes year fixed-effects, λ_t, and property type fixed-effects,

[36] These costs are not operating expenses (e.g. real estate taxes, insurance, administrative expenses) and instead are cash outlays that occur outside of the regular operating cycle of a property.

[37] All regression analyses use the the natural logarithm of the CAPEX measure on the property as the dependent variable where cumulative CAPEX is the sum of CAPEX spent on the property each quarter since the property was purchased.

θ_p, and standard errors are clustered by county. I estimate the regression for all properties that are held up to 4 years to match with the estimation window of my main analysis. The regression sample includes only stabilized properties which, based on the NCREIF definition, means the property's construction is complete and it is at least 60% occupied.

Table 1.8 shows the results. Columns 1 to 5 in the table use $ln(Cumul.CAPEX)_{i,p,t}$ as a dependent variable and sequentially add in controls and fixed effects. Columns 4 shows the first key result: on average, pension funds invest about 28% cumulative CAPEX into the buildings they purchase. In column 5, the regression sample is restricted to include only properties from the four major property types: apartment, office, industrial, and retail. This ensures that the finding is not driven by investments in (re)development projects which would require significantly more CAPEX. The estimated difference in cumulative CAPEX remains nearly unchanged.

Columns 6 and 7 test where the difference in CAPEX intensity comes from: building or leasing CAPEX.[38] The results show that properties owned by public pension funds invest more into the building, but do not undertake more aggressive leasing and tenant improvement programs, than REPE funds. These results combined indicate that more property level investment by pension funds to increase the size and productivity of the property is what makes it more attractive to new firms or allows existing firms to expand which links the CAPEX activity to employment.[39]

1.7 CRE Investment Returns

This section begins with a description of the returns earned by pension funds and how they fare relative to other CRE investors. After the initial descriptive exercise, the analysis

[38]Building CAPEX is spent to improve the property or to expand the leasable area. More leasable area allows for expansion of existing firms within the property or the relocation of new firms to the building. Both activities increase employment. Lease CAPEX is spent on paying lease brokers to find tenants and on tenant improvements (TI) to customize space within the building for new tenants or existing tenants that renew their lease.

[39]Unfortunately, the NCREIF data do not have any information on the tenants in the building over the property's holding period to link the CAPEX directly to changes in employment at the tenant-level.

examines the correlation between the financial returns earned and the impact on employment generated to assess whether social returns (i.e. employment growth) come at a cost of financial returns. It is important to understand the trade-off to determine whether targeting social objective is a logical policy for pension fund investments. If downstream economic benefits offset some of the costs of lower financial returns then the policies can be viewed as a net-positive. However, if the economic benefits are meager and/or large financial losses, then pension funds should reconsider their desire to pursue a dual mandate.

1.7.1 Realized Returns

Commercial real estate assets are infrequently traded assets relative to many other financial assets such as public equities. However, the RCA data allow for creation of a property-level panel to track commercial properties as they transact over time. The sample contains 23,500 properties with at least two transactions in the data (i.e. are bought and sold at least once) and this generates 54,150 transactions that can be utilized to assess returns.

First, I calculate simple, net returns for all CRE investments as: $R^{Net}_{t_{Purchase},t_{Sale}} = \frac{P_{Sale}}{P_{Purchase}} - 1$. The results are shown in Table 1.9. The first two rows of the table consider all holding periods. The average net return is 63% ($\sigma = 254\%$), the median return is 24%, and the average holding period is 4.83 years or 58 months, using all observations ($N = 30,602$). If we consider only those properties held for at least 12 months, the average net return is 56% ($\sigma = 238\%$), the median return is 24%, and the average holding period is 5.18 years, or 61 months ($N = 28,323$). The 7 percentage point decrease in the average net return due to excluding short-term holds indicates that property flips can earn substantial returns for investors. However, flipping of commercial properties is uncommon with only about 8% of transactions being held for less than 1 year and even with the short-hold transactions removed return variability does not decrease substantially. The return distribution is highly skewed with some properties earning triple-digit or higher returns. Figure 1.11 illustrates the return distribution. The plot shows a histogram of returns after removing the 1% tails of the return distribution and considering round-trip transactions where the property is held for at least 1 year ($N = 27,756$).[40]

To facilitate comparison of returns over different holding periods, investors, and property types, I calculate the annualized rate of return earned on properties that are held for at least 1 year using observed transaction prices. The equation below illustrates the calculation, where P_{Sale} is the sale price of the property, $P_{Purchase}$ is the original purchase price of the property, and N is the number of years the property is held by the investor, and NOI is the net operating income of the property at purchase. The holding period, in years, is calculated as the ratio $\frac{m}{12}$ months.

$$R_{hold}^{ann} = \left(\frac{(P_{sale} + (N \times NOI))}{P_{purchase}} \right)^{(\frac{1}{N})} - 1 \tag{3}$$

Where possible, I incorporate the property's income inferred by using data on the property's capitalization rate at purchase.[41] Roughly 25-30% of transactions have a cap rate and thus an implied net operating income (NOI). In calculating the return, I make the simplifying assumption that NOI remains constant over the holding period and is paid out at the end of each year.[42] The average annualized return over the entire sample is 13% ($\sigma = 45\%$) and the median annualized return is 6.5% (Table 1.9).

I summarize and compare the CRE returns for investments made by public pension funds and three additional groups of investors. The first group contains all CRE investments by

[40] The skew in the histogram increases substantially if the observations in the 1% tails are included and the graph becomes uninformative.

[41] The capitalization rate, or cap rate for short, represents the value of net income earned per dollar paid for the property. This ratio is an identity that is commonly used in real estate to compare properties with varying characteristics using a single metric. Intuitively, it is similar to a current yield, the amount of current income received per current dollar value of the investment, and thus extracting the NOI from the capitalization rate by dividing the observed market price by the cap rates in the data provides a measure of current income at the purchase date of the CRE asset.

[42] The difference between the ex-NOI and NOI-included returns, averaged across all transactions and investors, is approximately 1.5%.

Equity Funds[43], Investment Managers[44], Open-ended Funds, and Listed Funds. This group is designated as real estate private equity (REPE). The second group aggregates investments made by Banks, Corporations, Financial Firms, and Insurance as Finance/Insurance. The third group consists of transactions by publicly traded REITs, non-traded REITs, and REOCs denoted as REIT/REOC. The last group contains investments by Sovereign Wealth Funds, Endowments, and non-US pension funds together as Institutions.[45]

Table 1.10 shows the returns earned by different investors. US public pension funds in my sample earn an annualized return of 7.4% per year ($\sigma = 22.6\%$), on average, and a median return of 4.6% per year. Public pensions earn lower returns than the REPE funds, Finance and Insurance, and Institutional Investor groups but earn higher returns than REITs and REOCs. However, pension fund investments exhibit the best risk-return measured by the coefficient of variation (CV). Returns for all investor groups have an enormous range from near total losses (e.g. -92.3% annualized) to multiple fold gains (e.g. 1907% annualized). The average holding period is roughly 5 to 6 years for all investor groups and the cap rates implied by their investments are quite similar. REPE funds earn the highest annualized returns (13.0%, $\sigma = 43.0\%$) and REITs and REOCs earn the lowest annualized returns (6.0%, $\sigma = 28.6\%$).

Next, I look at how returns vary for public pension funds across space. I hypothesize that public pension funds' incentives to invest for growth are strongest when they invest locally. If they do trade-off returns for economic growth, then one would expect home state investments to earn lower financial returns than investments elsewhere. On the other hand, these investments may outperform if the public pension fund benefits from a local

[43] These are real estate private equity funds that includes major players such as Bain Capital, Blackstone, or Starwood Capital as well as many other medium and small firms that take LP capital to invest in real estate.

[44] For example, Berkshire Realty Holdings, CBRE Global Investors, or USAA Real Estate.

[45] Many transactions are carried out by Developer/Owner/Operator investors. These are more speculative and are usually outside the realm of typical investments made by public pension funds so I exclude these from the analysis.

information advantage. Table 1.11 shows that investments in the pension fund's home state outperform investments elsewhere by a factor of 2 earning a 12% average annualized return versus a 6% average annualized return for investments in adjacent or more distant states. A two-sided t-test for the difference in means for average annualized returns between home state investments and all other investments is statistically significant at the 1% level.[46] Holding periods are not significantly different across geographies ($p < 0.13$). The average capitalization rates and prices for home state investments are larger ($p < 0.10$) than in other geographies as well which indicates that the home state investments are not simply a matter of buy low, sell high. The average price for distant investments is \$35M while the average home state investment is \$55M.

1.7.2 Return-Impact Trade-off

While there is some evidence that investors accept lower returns for *potential* impact by investing in impact/ESG related funds (Barber et al. (2019)), the existence of *actual* impact that may offset the lower financial returns is not well documented. The main results in this paper show that public pension funds can generate more zip code employment with their CRE investments relative to REPE funds. In this section, I assess whether public pension funds make investment decisions that are consistent with a trade-off between financial returns and the employment benefit (i.e. impact) that their investments generate.

The returns-impact trade-off assumed in previous literature stipulates that investors derive utility from the social impacts of their investments. This non-pecuniary utility acts as a replacement for utility gained from financial returns and, as a result, investors with a stronger taste for impact will accept lower financial returns for their investments. The lower returns may arise for two reasons. First, investments that are associated with positive economic impacts may be lower NPV projects that earn lower net cash flows over the holding period. Second, investors are willing to pay more to buy the investment and this lowers the

[46]The difference is even larger when looking at average annualized excess returns (9% vs. 3%) and the difference remains significant at the 1%-level.

realized returns upon exit.

To test for the relationship between returns and the estimated employment impact, I conduct two cross-sectional tests using my main difference-in-differences specification. All pension fund CRE investments are grouped by return quartile and the regression is run within each return quartile to compare coefficients across each group of investments to determine the relationship between returns and impact, measured by employment growth. Table 1.12 shows the results for all investments and 1.13 shows the results for home state investments only. For both tables, each column shows the difference-in-differences estimate within a return quartile subsample. Each panel in the table show the estimates for several estimation windows (e.g. one year, two years, three years, and four years).

Panel A of Table 1.12 shows that pension fund investments across the distribution of returns result in larger subsequent increases in employment than investments by REPE funds using a 1-year estimation window. For example, in Column 1, pension fund investments that earn bottom quartile returns result in a 3.8% larger increase in zip code employment than investments by REPE funds. Investments in the top half of the returns distribution (Columns 3 and 4) are associated with 2-2.5% larger increases in zip code employment. In Panel B, estimated using a 2-year window shows similar results with CRE investments in the bottom quartile resulting in a 4.6% larger increase in zip code employment. In Panels C and D, measured using 3- and 4-year estimation windows, the pattern remains qualitatively the same however only investments in the top quartile of returns exhibit statistically significant differences in subsequent employment growth. Overall, the results provide evidence that the cross-section of pension fund CRE investments generates socially positive benefits of similar size across the returns distribution.

Results shown in Table 1.13 are estimated in the exact same fashion as those above, except that they are run on a further reduced subsample of home state investments only. This additional filter reduces the sample[47], but still provides some useful insights into the return-

[47] Roughly 20% of all transactions occur in the home state and approximately 30% of all investments have observed capital appreciation returns.

impact trade-off. Investments in a pension fund's home state are under the most scrutiny to generate additional jobs because of dual mandate and political pressures. Even with the small sample, the results show suggestive evidence that the bottom quartile investments are associated with the largest magnitude impacts on employment. For instance, pension fund CRE investments in the home state that earn bottom quartile returns are associated with about 16% to 18% larger increases in subsequent zip code employment relative to REPE funds using 3- and 4-year estimation windows, respectively.

In conclusion, the results provide suggestive evidence for a return-impact trade-off. CRE investments with returns in the top half of the distribution are positively associated with increased zip code employment. In general, investments that earn poor returns (i.e. the bottom quartile) do not exhibit outsized impact on subsequent employment relative to better performing CRE investments. However, the return-impact trade-off seems most prevalent for home state investments. Within this subsample, investments in the bottom return quartile, which have an average annualized return of -7% per year, are associated with incremental increases in employment that are substantially larger in magnitude relative to baseline and to home state investments earning higher returns.

1.8 Robustness

To validate the robustness of my main findings, I re-estimate the model using several different sample restrictions to ensure that the effects are not being driven by small or very large transactions, whether the effect is strictly a "California effect", and if the results are influenced by other omitted time-varying zip code variables. All the additional tests use a four-year window before and after treatment to be comparable with the main result shown in column 4 of Table 1.3.

Table 1.14 displays the results of the robustness checks. Column 1 simply shows the main results for comparison. Columns 2 and 3 test for robustness to the exclusion of transactions with prices in the left or right tails of the price distribution. The cutoffs of $5M and $500M roughly represent the 5%-tails. The estimated effect in columns 2 and 3 is essentially the same as the full sample indicating that the results are not sensitive to transaction size. Columns 4 and 5 test if the estimated association with employment growth is driven primarily by transactions by the California public pensions, CalPERS and CalSTRS. The California pensions are pioneers in running their own internally managed real estate portfolios and thus may have more expertise than other pensions in identifying investments with both a financial and real economic gain. However, the data show that both the sample that excludes all of the California pensions (column 4) and one that included only the California pensions (column 5) exhibit positive employment growth post-treatment.

Even though I include lagged zip code employment growth and business establishment growth to control for time-varying zip code characteristics, there could be an omitted variable that affects employment growth. Using data from 2011 to 2017 from the American Community Survey, I include annual controls for average household size, percent with a college education, median household income, percent below poverty level, rental vacancy rate, and the total population of the zip code. Since these controls are only available for a short period, the sample size drops significantly and the effect is estimated on the full sample. Again, the effect is similar to the main result. In untabulated results, even if the model is re-estimated using a shorter window, such as 1-year or 2-years before and after, the effects are similar to those in columns 2 and 3 of Table 1.3.

I perform additional robustness tests for the main results using an alternative empirical specification (untabulated). Using deal-level data, I estimate a pooled OLS regressions of either zip code $ln(Emp)_{t+2}$ or $\Delta ln(Emp)_{t-2,t+2}$ on an indicator for whether the investment is a direct pension fund investment or a REPE fund investment. I also include controls for the property type (indicators; hotel is excluded category); the investment amount, in millions of dollars; and lags of zip code employment (or employment growth). I also include year and zip code fixed effects and cluster standard errors at the county level. Overall, the results using this alternative method are similar to the main findings: after 2 years, employment in the treated zip codes is higher by about 2%. This effect is consistent with the results obtained using the difference-in-differences empirical strategy on the matched sample.

1.9 Conclusion

Investments in commercial real estate assets can reflect local economic activity. However, some CRE projects may anchor economic growth, whereas others simply ride the existing wave. In this paper, I show that direct CRE investments made public pension funds have a subsequent positive impact on employment that is 3.5% larger than CRE investments by REPE funds, on average. The location of the investment relative to the pension fund is also correlated with the size of subsequent employment growth. Home state investments generate a 6% increase in zip code employment in the 4 years that follow. Moreover, political influences on the board of trustees affect the types of investments chosen. Boards with more political appointees make investments that result in roughly 2% larger employment benefits than boards with fewer politically appointed members. The investments spur job growth in the service-sector and the effects are felt at both small firms and large employers.

I examine two potential explanations for why pension fund investments result in subsequent employment growth. First, their investment acts as a signal to other investors that the zip code contains high quality properties which attracts subsequent investments. The analyses show that treated zip codes receive an additional $38M in investment after treatment and the effect does not aggregate up to the county, so the information from pension fund investment is very localized. In addition, the majority of follow-on capital comes from REPE funds and developers. These investments help to improve the property stock and decrease constraints on the supply of space. Second, since CRE ownership requires diligent management of the property, I compare capital expenditures on building improvements and leasing between pension fund owned properties and REPE fund owned properties. I find that pension funds invest more into the buildings measured by cumulative CAPEX. Their cumulative CAPEX spending on building improvements is the key driver. This investment improves building productivity and capacity (i.e. leasable square footage) enabling firms to grow.

Pension funds earn respectable returns on their direct investments. On average, they earn 7% annualized returns and these investments also appear to outperform the roughly 4% return (measured as IRR) earned from their delegated investments (untablulated).[48] Moreover, when considering the location of their investments, home-state investments earn significantly higher returns (12%) compared to distant-state investments (6%).

Do pension funds face a returns-impact trade-off when choosing their CRE investments? Many public pension funds state in their investment policies that they will consider investments that drive additional economic benefits, in particular job growth. My final analysis looks at how the size of the employment effect correlates with realized returns on direct investments. I find that investments in the bottom quartile of returns, which have an average annualized return of -7%, are associated with positive impacts on subsequent employment of roughly 4% when considering a 2-year horizon post-investment. Moreover, bottom quartile return investments in the home state investments are associated with an 18% increase in zip code employment in subsequent 4 years and the effect is qualitatively the same when considering shorter horizons. Even though the estimates are noisy, this result shows suggestive evidence in favor of the return-impact trade-off. The results also imply that the objectives of dual mandates may come a high cost to public pension funds and that committing a large portion of the portfolio for these goals would potentially be unwise.

Are the spillovers able to compensate the pension funds for the financial returns they forgo? Of the pension funds that invest over$1Bn directly in CRE, the average share of direct investments in their total real estate portfolios as of 2016 is 35%. The California state pensions, CALPERS and CALSTRS, are outliers that invest on average 85% of their real estate portfolio directly. Excluding them reduces the average share of direct investments to 25% of the real estate portfolios of the pension funds. Either way, direct CRE investments

[48]The average annual IRR earned on commitments in their portfolio is about 4% (commitment-weighted) or 5% (equal-weighted).

represent a large share of their allocation and of their real estate portfolio returns. A back of the envelope calculation indicates that the effects of the spillovers likely do not offset the lower returns. The average home state CRE investment is about $55M. The average treated zip code has 19,500 jobs and the average increase in employment is 3.5% in the 4 years after investment. This translates into roughly 700 additional jobs in the average zip code. Average wages in treated zip codes in the home-state investment sample are about $54,000 which translates into about $37.6M in additional payrolls of local benefit over 4 years. There are 270 home state investments in the sample which translates into an aggregate effect of $10.1Bn. Only a fraction of this additional income will be collected as tax revenue. It seems that while the spillovers provide local benefits, they probably do not improve the financial position of the pension funds.

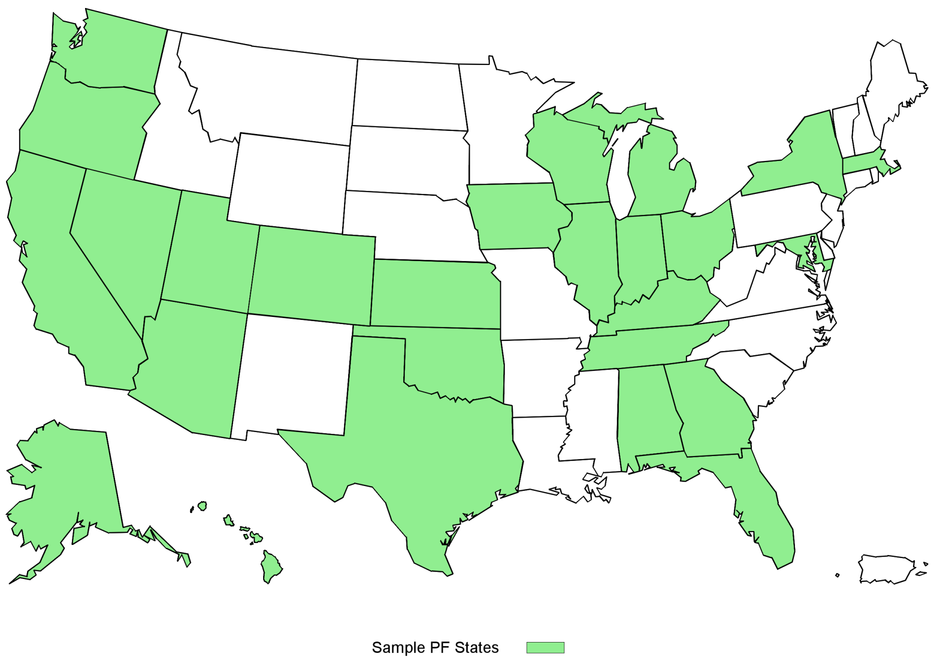

Figure 1.1: This map highlights the states where the public pension funds in the analysis sample are located. The states filled in green are those in which a pension fund that has direct CRE transactions is headquartered. The public pension funds in the sample are either state or local (e.g. county or city) pension funds. In total, there are 39 pension plans from 26 states.

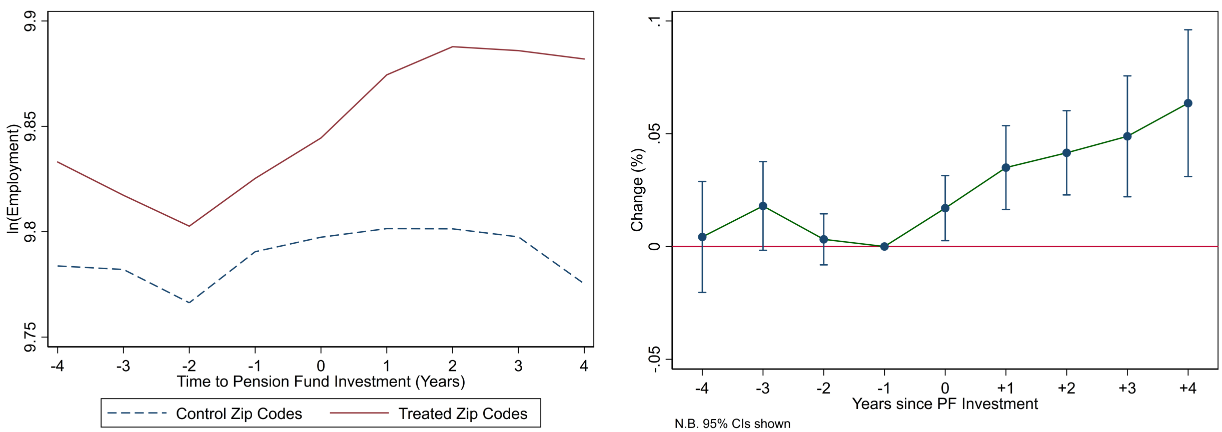

Figure 1.2: Plots of pretrends for the main dependent variable, $ln(Emp)$. The line graph on the left shows the average level of $ln(Emp)$ in the treated (red) and control (blue) zip codes. Treated zip codes received CRE investments from pension funds while control zip codes received CRE investment from equity funds. The control zip codes are located in the same state and received investment from equity funds in the same treatment year. The line graph on the right plots the regression coefficients from a leads-lags model, estimated in column 1 of Table B.5 that illustrates the dynamics of the effect. Before the pension fund invests at time 0, there is no statistical difference between the two series.

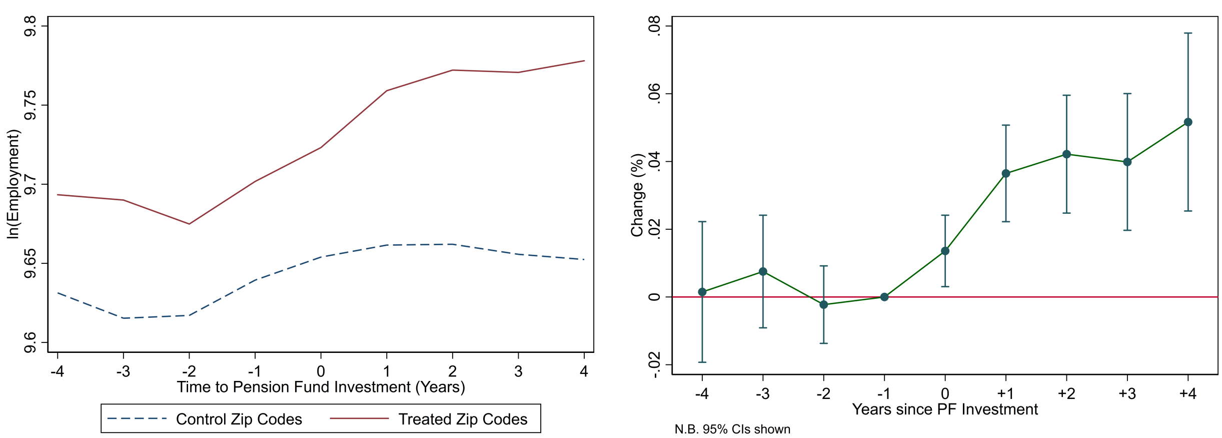

Figure 1.3: Plots of pretrends for the dependent variable, $ln(ServiceEmp)$. The line graph on the left shows the average level of $ln(ServiceEmp)$ in the treated (red) and control (blue) zip codes. Treated zip codes received CRE investments from pension funds while control zip codes received CRE investment from equity funds. The control zip codes are located in the same state and received investment from equity funds in the same treatment year. The line graph on the right plots the regression coefficients from a leads-lags model, estimated in column 2 of Table B.5 that illustrates the dynamics of the effect. Before the pension fund invests at time 0, there is no statistical difference between the two series.

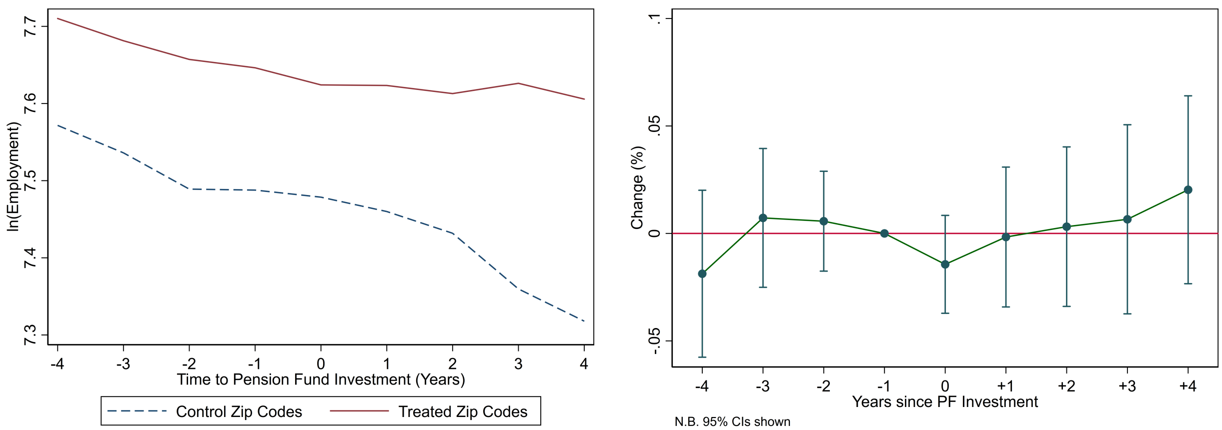

Figure 1.4: Plots of pretrends for the dependent variable, $ln(GoodsEmp)$. The line graph on the left shows the average level of $ln(GoodsEmp)$ in the treated (red) and control (blue) zip codes. Treated zip codes received CRE investments from pension funds while control zip codes received CRE investment from equity funds. The control zip codes are located in the same state and received investment from equity funds in the same treatment year. The line graph on the right plots the regression coefficients from a leads-lags model, estimated in column 3 of Table B.5 that illustrates the dynamics of the effect. Before the pension fund invests at time 0, there is no statistical difference between the two series.

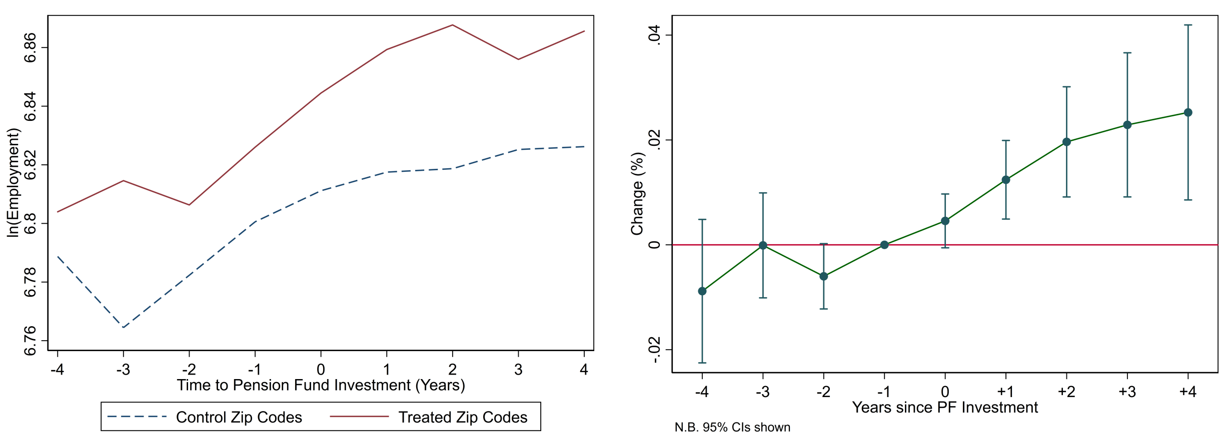

Figure 1.5: Plots of pretrends for the dependent variable, $ln(SmallBizEmp)$. The line graph on the left shows the average level of $ln(SmallBizEmp)$ in the treated (red) and control (blue) zip codes. Treated zip codes received CRE investments from pension funds while control zip codes received CRE investment from equity funds. The control zip codes are located in the same state and received investment from equity funds in the same treatment year. The line graph on the right plots the regression coefficients from a leads-lags model, estimated in column 4 of Table B.5 that illustrates the dynamics of the effect. Before the pension fund invests at time 0, there is no statistical difference between the two series.

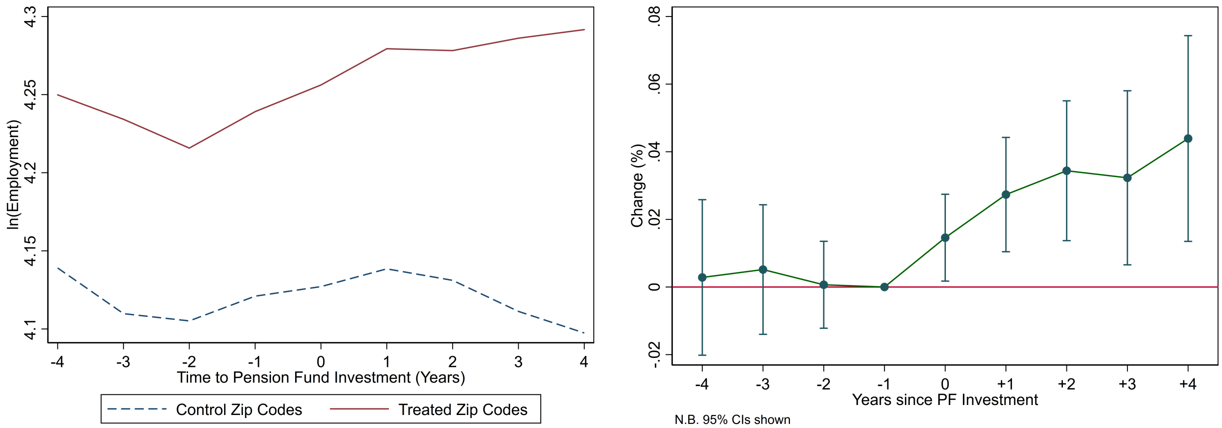

Figure 1.6: Plots of pretrends for the dependent variable, $ln(BigBizEmp)$. The line graph on the left shows the average level of $ln(BigBizEmp)$ in the treated (red) and control (blue) zip codes. Treated zip codes received CRE investments from pension funds while control zip codes received CRE investment from equity funds. The control zip codes are located in the same state and received investment from equity funds in the same treatment year. The line graph on the right plots the regression coefficients from a leads-lags model, estimated in column 5 of Table B.5 that illustrates the dynamics of the effect. Before the pension fund invests at time 0, there is no statistical difference between the two series.

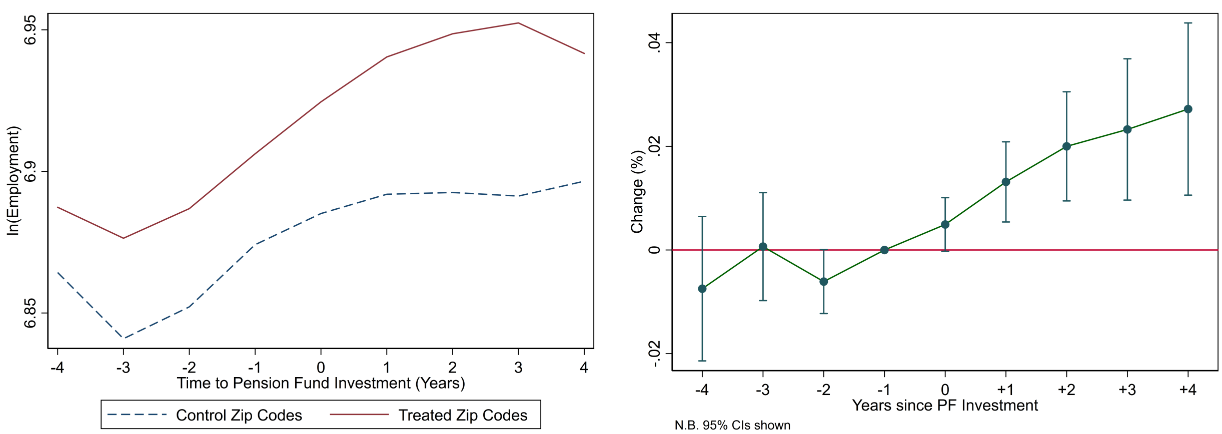

Figure 1.7: Plots of pretrends for the dependent variable, $ln(Est)$. The line graph on the left shows the average level of $ln(Est)$ in the treated (red) and control (blue) zip codes. Treated zip codes received CRE investments from pension funds while control zip codes received CRE investment from equity funds. The control zip codes are located in the same state and received investment from equity funds in the same treatment year. The line graph on the right plots the regression coefficients from a leads-lags model, estimated in column 6 of Table B.5 that illustrates the dynamics of the effect. Before the pension fund invests at time 0, there is no statistical difference between the two series.

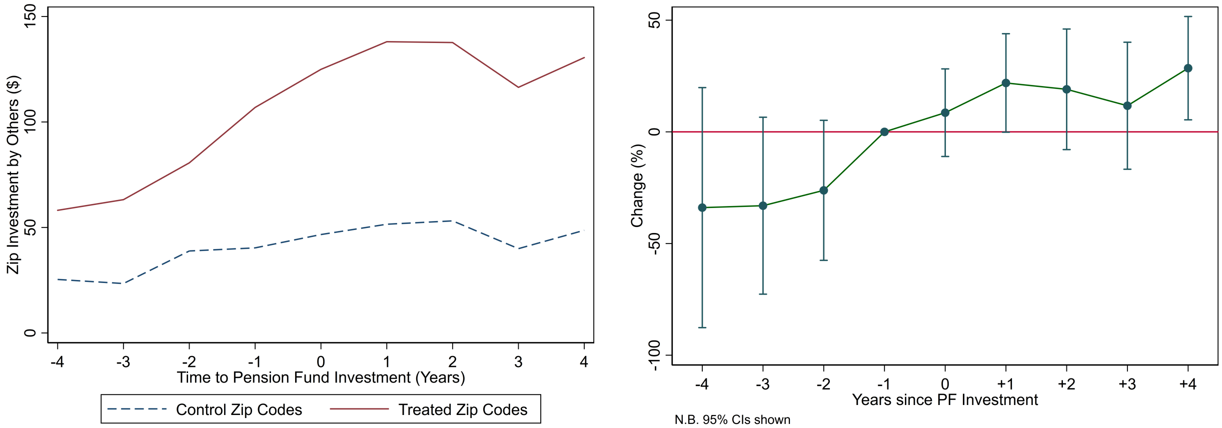

Figure 1.8: Plots of pretrends for the dependent variable, Zip $ Volume of Other Investors. The line graph on the left shows the average level of Zip $ Volume of Other Investors in the treated (red) and control (blue) zip codes. Treated zip codes received CRE investments from pension funds while control zip codes received CRE investment from equity funds. The control zip codes are located in the same state and received investment from equity funds in the same treatment year. The line graph on the right plots the regression coefficients from a leads-lags model, estimated in column 7 of Table B.5 that illustrates the dynamics of the effect. Before the pension fund invests at time 0, there is no statistical difference between the two series.

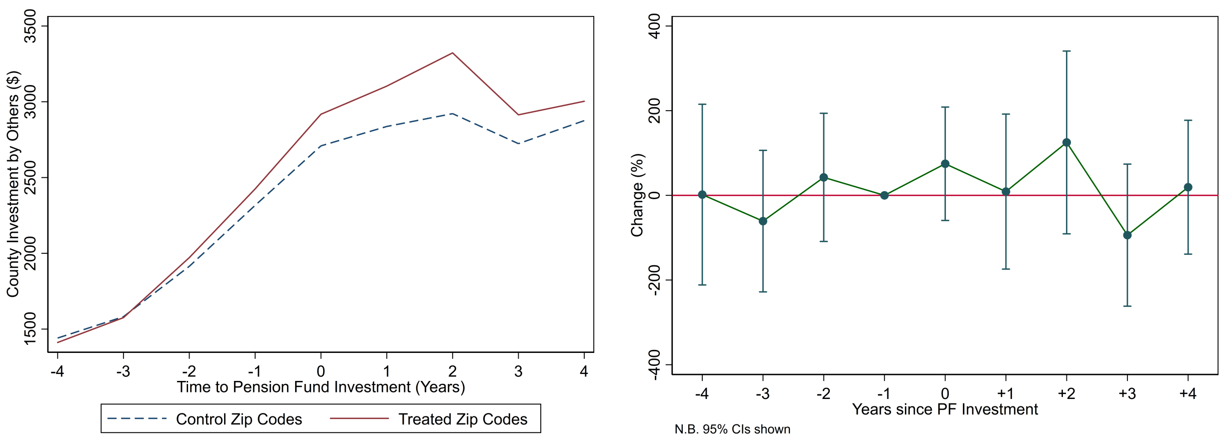

Figure 1.9: Plots of pretrends for the dependent variable, County $ Volume of Other Investors. The line graph on the left shows the average level of County $ Volume of Other Investors in the treated (red) and control (blue) zip codes. Treated zip codes received CRE investments from pension funds while control zip codes received CRE investment from equity funds. The control zip codes are located in the same state and received investment from equity funds in the same treatment year. The line graph on the right plots the regression coefficients from a leads-lags model, estimated in column 8 of Table B.5 that illustrates the dynamics of the effect. Before the pension fund invests at time 0, there is no statistical difference between the two series.

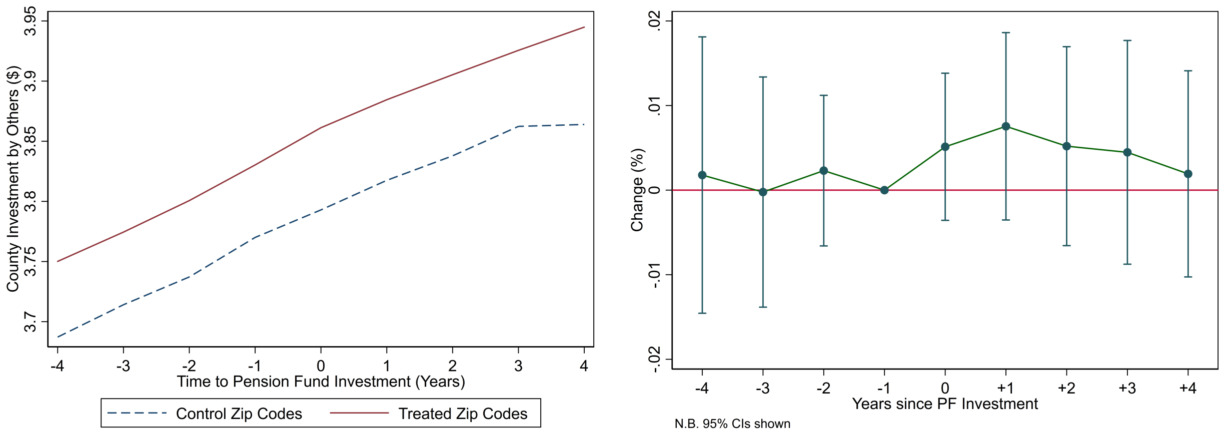

Figure 1.10: Plots of pretrends for the dependent variable, $ln(WageperWorker)$. The line graph on the left shows the average level of $ln(WageperWorker)$ in the treated (red) and control (blue) zip codes. Treated zip codes received CRE investments from pension funds while control zip codes received CRE investment from equity funds. The control zip codes are located in the same state and received investment from equity funds in the same treatment year. The line graph on the right plots the regression coefficients from a leads-lags model, estimated in column 9 of Table B.5 that illustrates the dynamics of the effect. Before the pension fund invests at time 0, there is no statistical difference between the two series.

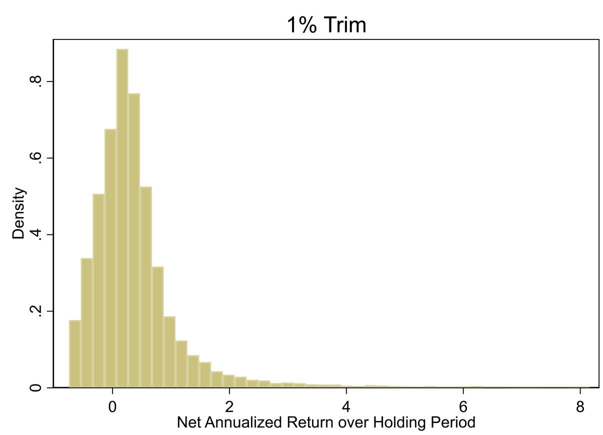

Figure 1.11: Histogram of the net returns for property level transactions. The plot shows a histogram of returns after removing the 1% tails of the return distribution and considering only the round-trip transactions where the property is held for at least 1 year ($N = 27,756$).

Table 1.1: Summary Statistics for the pension funds. Panel A summarizes the characteristics of commmercial real estate investments by public pension funds in the sample. Panel B shows summary statistics of the characteristics of the public pension funds. Panel C summarizes their asset allocations. Panel D summarizes their portfolio level returns by asset class. The data for Panel A come from the main sample of CRE transactions while panels B, C, and D use the Public Plans Database.

Panel A: Pension Fund CRE Transactions	N	Mean	Median	Std Dev	Minimum	Maximum
Sq ft.	1586	427,702	178,777	2,165,536	1,728	58,806,000
Year Built	1560	1985	1987	22	1722	2020
Price ($M)	1703	54.51	21.43	140.19	0.24	2829.04
CBD	1703	0.15			0	1
Apartment	1703	0.17			0	1
Office	1703	0.21			0	1
Retail	1703	0.20			0	1
Industrial	1703	0.36			0	1
Hotel	1703	0.02			0	1
Dev. Site	1703	0.03			0	1
Home State	1703	0.19			0	1
Adjacent State	1703	0.05			0	1
Distant State	1703	0.76			0	1
Observations	1703					
Panel B: Pension Fund Characteristics						
Assets ($Bn)	655	40.13	17.19	49.21	1.32	302.42
Liabilites ($Bn)	655	48.68	23.80	59.88	1.44	436.70
Funded Ratio	655	0.82	0.83	0.18	0.34	1.79
Required Contribution ($Bn)	643	1.08	0.58	1.50	-	10.89
% Req Cont Paid	650	0.91	1.00	0.28	0.00	5.28
Total Contributions ($Bn)	659	1.48	0.79	2.03	0.01	16.54
Total Benefits Paid ($Bn)	459	2.09	1.14	2.36	0.06	15.57
Total Membership	644	320,509	169,819	362,481	6,710	1,925,459
Panel C: Pension Fund Asset Allocation						
Equity	661	53.9%	54.5%	9.3%	22.3%	76.2%
Fixed Income	661	26.2%	25.3%	7.6%	7.2%	53.5%
Real Estate	553	8.5%	8.5%	3.3%	0.1%	18.7%
Private Equity	523	7.8%	7.4%	5.2%	0.0%	26.0%
Hedge Funds	281	6.0%	4.3%	5.1%	0.0%	24.0%
Commodities	178	4.7%	3.5%	4.0%	0.1%	18.2%
Cash	492	2.7%	2.0%	2.4%	-9.0%	17.2%
Panel D: Pension Fund Returns						
Assumed Invt. Return	652	7.8%	7.8%	0.3%	6.8%	8.5%
Equity	582	6.6%	10.5%	16.9%	-42.0%	53.5%
Fixed Income	601	5.8%	6.1%	4.5%	-15.9%	21.5%
Real Estate	521	9.7%	11.6%	12.7%	-47.9%	40.4%
Private Equity	477	10.8%	13.2%	14.7%	-53.7%	45.3%
Hedge Funds	236	4.9%	6.0%	9.6%	-34.6%	39.0%
Commodities	154	3.7%	5.0%	13.2%	-55.3%	42.9%
Cash	269	2.1%	1.1%	3.2%	-25.2%	19.0%
Observations	663					

Table 1.2: Summary Statistics for the treated and control zip codes. The panel on the left compares the treated zip codes (i.e those that receive public pension fund commercial real estate (CRE) investments) to control zip codes (i.e. real estate private equity (REPE) fund CRE investments). The comparison is made using data as of 1-year prior to the investment year. REPE funds tend to invest in zip codes with higher business growth and in zip codes located in counties that receive more investment on average. The right panel compares the matched sample of zip codes at period $t-1$ in event time (i.e. the year before CRE investment). The table shows that after matching, characteristics of the treated and control zip codes not differ significantly on observable characteristics. In addition, those variables that were not statistically different in the unmatched sample, but were economically distant – such as county business growth, $\Delta(Est)_{z,t,t-1}$, which differed by nearly 5% – are all similar.

	Unmatched Comparison				Matched Comparison			
	Mean Control	Mean Treated	Diff.	t	Mean Control	Mean Treated	Diff.	t
$ln(Emp)_{z,t}$	9.769	9.765	0.004	0.157	9.782	9.815	-0.032	-0.922
$ln(Est)_{z,t}$	6.890	6.838	0.052**	2.505**	6.875	6.890	-0.014	-0.490
$\Delta(Emp)_{z,t,t-1}$	0.022	0.033	-0.010	-1.332	0.032	0.030	0.003	0.595
$\Delta(Est)_{z,t,t-1}$	0.030	0.076	-0.045	-0.862	0.019	0.020	-0.001	-0.282
$\Delta(RealGDP)_{z,c,t,t-1}$	0.026	0.025	0.001	0.850	0.025	0.024	0.001	0.843
$\Delta(Pop)_{z,c,t,t-1}$	0.011	0.011	-0.000	-0.206	0.010	0.010	-0.000	-0.799
$\Delta(Emp)_{z,c,t,t-1}$	0.019	0.015	0.004***	6.880***	0.011	0.010	0.001	1.453
$\Delta(PerCapInc)_{z,c,t,t-1}$	0.050	0.050	-0.000	-0.256	0.042	0.042	0.001	0.345
$(CRE\$Vol)_{z,c,t,t-1}$	3573.486	2690.064	883.422***	6.685***	2266.474	2442.698	-176.224	-1.136
Observations	23086				2646			

Table 1.3: Public pension fund commercial real estate (CRE) investments have a differential effect on zip code employment. The dependent variable is $ln(Emp)$. The variable $Treated$ is an indicator equal to 1 for any zip code that received CRE investment from a public pension fund. Otherwise, the indicator is equal to 0 for all zip codes that received CRE investment from a REPE fund. The variable $Post$ is an indicator equal to 1 for all years after treatment, inclusive. The variable $Treated \times Post$ is the product. Each specification from column 1 to 3 is estimated using the full sample and adds, in sequence, vintage x year FEs to control for secular trends; controls for time-varying zip and county growth measures; and zip code FEs to control for unobserved heterogeneity. Note the addition of fixed effects into the regression subsume the $Treated$ and $Post$ indicators. Column 3 estimates the main specification using all data. Columns 4 and 5 estimate the effect on subsequent employment using 1-year and 2-year windows to understand the dynamics of the effect and they show the effect is relatively rapid. Column 6 shows the main result: public pension fund CRE investments result in a 3.5% increase in employment in the 4 years following investments. For all estimations, standard errors are clustered by county.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Treated	0.025	0.056					
	(0.32)	(0.66)					
Post	0.033						
	(0.73)						
Treated × Post	0.094*	0.083	0.054***	0.021***	0.023***	0.027***	0.035***
	(1.87)	(1.46)	(3.67)	(2.98)	(3.15)	(2.98)	(3.17)
Adj. R^2 Within	0.004	0.052	0.023	0.047	0.051	0.046	0.036
Clusters	237	231	231	215	218	214	204
Observations	44,659	37,286	37,286	6,563	10,376	13,299	14,861
Zip FE	N	N	Y	Y	Y	Y	Y
Vintage x Year FE	N	Y	Y	Y	Y	Y	Y
Controls	N	Y	Y	Y	Y	Y	Y
Window	All	All	All	+-1Yr	+-2Yr	+-3Yr	+-4Yr

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 1.4: Public pension fund commercial real estate (CRE) investments affect employment in the service sector and have positive impact on businesses with fewer than 50 employees (small) and those with more than 50 employees (large). Using the main regression specification in Equation 1.4, I estimate the effect of public pension fund CRE investment on broad sector employment (columns 1 and 2) and the effect on employment at different sized firms (columns 3 and 4). I classify employment into Service sector and Goods Producing sector employment using NAICS codes from the Bureau of Labor statistics. Small businesses are defined as those with fewer than 50 employees while large businesses are those with 50 or more employees. All regressions estimate the effects using a 4 year pre/post investment window, include controls for time-varying zip and county growth measures, include zip and vintage x year fixed effects, and standard errors are clustered by county.

	(1) ln(Service Emp)	(2) ln(Goods Emp)	(3) ln(Small Biz Emp)	(4) ln(Big Biz Emp)
Treated × Post	0.035***	0.002	0.020***	0.028***
	(3.56)	(0.14)	(3.06)	(2.66)
Adj. R^2 Within	0.988	0.974	0.993	0.984
Clusters	204	204	204	203
Observations	14,568	14,552	14,568	14,544
Zip FE	Y	Y	Y	Y
Vintage x Year FE	Y	Y	Y	Y
Controls	Y	Y	Y	Y
Window	+-4Yr	+-4Yr	+-4Yr	+-4Yr

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 1.5: Public pension fund commercial real estate (CRE) investments have a larger impact on employment if they are located in the home state of the pension fund. The dependent variable for all regressions shown in the table is $ln(Emp)$. For reference, column 1 displays the main result from Table 1.3, column 6. Using the main regression specification in Equation 1.4, I re-estimate the model for subsamples based on where the CRE investment is located relative to the home state of the public pension fund making the investment. Results in column 2 are for CRE investments located the home state of the pension fund. Column 3 shows the result for investments in adjacent states, those that share a physical border with the pension fund's home state. Column 4 estimates the model on investments taking place in distant states (i.e. those states that are not in the first two groups). The magnitude of the effect diminishes with distance. Home state and distant state investments exhibit positive and significant spillovers to employment and are statistically different from each other (column 5, triple difference regression). AAll regressions estimate the effects using a 4 year pre/post investment window, include controls for time-varying zip and county growth measures, include zip and vintage x year fixed effects, and standard errors are clustered by county.

	(1)	(2)	(3)	(4)	(5)
Treated × Post	0.035***	0.065***	0.040	0.028**	0.027**
	(3.17)	(4.32)	(1.31)	(2.06)	(2.04)
Home					-0.011
					(-0.67)
Treated × Home					0.016
					(0.66)
Post × Home					-0.023
					(-1.22)
Treated × Post × Home					0.035*
					(1.78)
Sample	Main	Home	Adjacent	Distant	Home v. Distant
Adj. R^2 Within	0.036	0.045	0.035	0.042	0.042
Clusters	204	65	25	189	201
Observations	14,861	3,080	460	11,321	14,401
Zip FE	Y	Y	Y	Y	Y
Vintage x Year FE	Y	Y	Y	Y	Y
Controls	Y	Y	Y	Y	Y
Window	+-4Yr	+-4Yr	+-4Yr	+-4Yr	+-4Yr

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 1.6: Public pension funds with more political appointees on the board make investments that are associated with larger subsequent employment gains. The table shows the regression results of cross-sectional tests using the main regression specification in Equation 1.4. The sample is split based on the board composition for appointed, *ex-officio*, and elected members on the board. Columns 1 to 3 compare the effect on $ln(Emp)$ for boards with below or above median percent of appointed board members. Columns 4 to 6 compare the effect on $ln(Emp)$ for boards with below or above median percent of *ex-officio* board members. Columns 7 to 9 compare the effect on $ln(Emp)$ for boards with below or above median percent of elected board members. Overall, boards with above median appointed or below median elected percent of the board invest in CRE properties that are associated with stronger employment effects after treatment.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Appointed			*Ex-Officio*			Elected		
Treated X Post	0.021*	0.050***	0.020*	0.034***	0.035**	0.036***	0.049***	0.022**	0.048***
	(1.89)	(3.49)	(1.77)	(2.77)	(2.53)	(2.83)	(3.10)	(2.13)	(2.97)
Appointed			0.008						
			(0.80)						
Treated X Appointed			-0.016						
			(-1.17)						
Post X Appointed			-0.007						
			(-0.48)						
Treated X Post X Appointed			0.030*						
			(1.85)						
Ex-Officio						0.004			
						(0.25)			
Treated X *Ex-Officio*						-0.023			
						(-1.07)			
Post X *Ex-Officio*						0.006			
						(0.47)			
Treated X Post X *Ex-Officio*						-0.001			
						(-0.07)			
Elected									-0.007
									(-0.59)
Treated X Elected									0.028*
									(1.71)
Post X Elected									0.001
									(0.05)
Treated X Post X Elected									-0.026
									(-1.51)
Adj. R^2 Within	0.04	0.05	0.04	0.03	0.04	0.04	0.05	0.03	0.04
Clusters	147	161	204	111	179	204	149	159	204
Observations	7,239	7,621	14,861	3,468	11,393	14,861	7,579	7,282	14,861
Zip FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Vintage x Year FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Controls	Y	Y	Y	Y	Y	Y	Y	Y	Y
Window	+-4Yr	+-4Yr	+-4Yr	+-4Yr	+-4Yr	+-4Yr	+-4Yr	+-4Yr	+-4Yr
% of Board	LT Median	GE Median	LT vs GE Median	LT Median	GE Median	LT vs GE Median	LT Median	GE Median	LT vs GE Median

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 1.7: *Informative Signal Channel*: public pension fund commercial real estate (CRE) investments lead to more capital flowing to the treated zip code from other investors. The dependent variables in columns 1 to 3 are the dollar volume of investment at the zip code level, in millions, from other investors (i.e. investors that are not US public pension funds). The dependent variable in column 1 is the aggregate dollar volume over all non-public pension fund investors while the dependent variables in columns 2 and 3 are the dollar volume invested by real estate private equity (REPE) funds and developers, respectively. Columns 4 to 6 repeat the analysis but at the county level. At one geographic level higher than zip code, the county level, investment signals for a specific zip code will be less important to the capital flows of other investors. Overall, there is a $40M increase in investment in the treated zip code by other investors in the 4 years after a pension fund invests (column 1) and roughly half of the effect comes from subsequent REPE fund and Developer investments. There is no statistically significant effect at the county level. All regressions estimate the effects using a 4 year pre/post investment window, include controls for time-varying zip and county growth measures, include zip and vintage x year fixed effects, and standard errors are clustered by county.

	(1) Zip Invt by Others ($)	(2) Zip Invt by REPE ($)	(3) Zip Invt by Dev ($)	(4) Cty Invt by Others ($)	(5) Cty Invt by REPE ($)	(6) Cty Invt by Dev ($)
Treated × Post	38.652***	16.100***	8.457**	27.472	30.316	14.274
	(2.82)	(2.88)	(2.01)	(0.41)	(0.92)	(0.79)
Adj. R^2 Within	0.017	0.009	0.004	0.307	0.313	0.183
Clusters	204	204	204	204	204	204
Observations	14,833	14,833	14,833	14,874	14,874	14,874
Zip FE	Y	Y	Y	Y	Y	Y
Vintage x Year FE	Y	Y	Y	Y	Y	Y
Controls	Y	Y	Y	Y	Y	Y
Window	+-4Yr	+-4Yr	+-4Yr	+-4Yr	+-4Yr	+-4Yr

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 1.8: *Asset Management Channel*: public pension fund commercial real estate (CRE) assets receive more CAPEX. Using asset-level accounting data, I estimate a panel regression with the dependent variable being the natural logarithm of cumulative CAPEX on the property. Cumulative CAPEX is the sum of CAPEX spent on the property each quarter since the property was purchased. In columns 1 to 5, I regress $ln(Cumul.CAPEX)$ on an indicator, $\mathbb{1}(PFProp)$, equal to 1 if the property is owned by a public pension fund and it is equal to 0 if owned by a real estate private equity (REPE) fund. I control for the size of the property, $ln(SqFt)$; the purchase price of the property, $ln(Purch.Price)$; and the age of the property at acquisition, $AgeatPurch.$. The regression is estimated for all properties owned up to 4 years to match with my main DD analysis window, that are stabilized, and are acquired after 1997. The regression includes year and property type fixed effects and standard errors are clustered conservatively by county. In columns 5 and 6, I estimate what type of CAPEX investment is being done on the property: building improvements and expansions or leasing commissions and tenant improvements, respectively. Overall, public pension funds invest more CAPEX and they primarily invest CAPEX to improve the building's productivity.

	(1) ln(Cumul. CAPEX)	(2) ln(Cumul. CAPEX)	(3) ln(Cumul. CAPEX)	(4) ln(Cumul. CAPEX)	(5) ln(Cumul. CAPEX)	(6) ln(Bldg CAPEX)	(7) ln(Lease CAPEX)
$\mathbb{1}(PFProp)$	0.688***	0.615***	0.354***	0.283**	0.292**	0.381**	0.043
	(5.03)	(4.49)	(2.81)	(2.10)	(2.14)	(2.28)	(0.26)
ln(Sq Ft)			0.755***	0.744***	0.736***	0.670***	0.732***
			(15.33)	(17.80)	(17.39)	(12.48)	(18.87)
ln(Purch. Price)			0.009	-0.008	-0.018***	-0.019*	-0.005
			(1.21)	(-1.39)	(-2.76)	(-1.94)	(-0.94)
Age at Purch.			-0.001***	-0.000***	-0.000***	-0.001***	-0.000***
			(-10.69)	(-5.12)	(-5.49)	(-5.67)	(-3.34)
Adj. R^2 Within	0.00	0.00	0.14	0.12	0.12	0.10	0.14
Clusters	420	420	399	399	339	315	277
Observations	57,982	57,982	46,803	46,803	43,313	32,461	27,020
Property Type FE	N	N	N	Y	Y	Y	Y
Year FE	N	Y	Y	Y	Y	Y	Y

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 1.9: Summary statistics for property transaction-level returns. The table shows the mean, standard deviation, and the overall distribution of simple net returns and holding periods for all observations; and simple returns, holding periods, and annualized returns for all transactions where the holding period is greater than or equal to 1 year. The returns are calculated using a property-level panel using actual transaction prices.

	N	Mean	SD	Min	P1	P5	P25	Median	P75	P95	P99	Max
Net Returns (%)	30602	0.629	2.545	-1.000	-0.742	-0.519	-0.062	0.239	0.609	2.504	9.286	180.710
Hold Period (Years)	30602	4.834	3.220	0.000	0.083	0.667	2.333	4.083	7.000	10.750	13.333	17.333
Net Returns - >= 1 Year Hold (%)	28323	0.560	2.385	-1.000	-0.744	-0.524	-0.072	0.244	0.601	2.124	8.158	180.710
Hold Period - >= 1 Year Hold (Years)	28323	5.185	3.090	1.000	1.083	1.333	2.667	4.500	7.250	10.917	13.417	17.333
Annualized Returns - >= 1 Year Hold (%)	28323	0.130	0.456	-1.000	-0.299	-0.120	0.002	0.065	0.158	0.493	1.500	27.519
Observations	30602											

Table 1.10: Nominal appreciation returns to CRE investments, by investor. The table shows the annualized returns for all investors listed as Institutional, Private, or Public that have at least 40 round-trip transactions in the data. The returns are calculated using a property-level panel for properties that are held at least 1 year. The returns are calculated using actual transaction prices and also include property NOI, where available. The Sharpe Ratios are calculated taking the average yield on 5-year treasuries over the sample period from 2001-2018 to match with the average holding period of about 5 years.

Investor	N	Mean	SD	Std Err	CV	Min	Median	Max	Hold (Yr)	N Caprate	Mean Caprate (%)
PF Sample	814	0.074	0.226	0.008	3.061	-0.784	0.048	3.921	5.801	202	0.068
REPE Funds and Invt Managers	16502	0.130	0.430	0.003	3.308	-0.923	0.070	19.072	5.016	3976	0.068
REITs and REOCs	2178	0.060	0.286	0.006	4.752	-0.866	0.029	6.131	6.302	617	0.072
Finance and Insurance	1770	0.111	0.408	0.010	3.689	-0.746	0.044	7.089	5.116	369	0.070
Institutional Investors	391	0.091	0.552	0.028	6.086	-0.476	0.038	9.991	6.031	95	0.064

Table 1.11: Returns for pension fund investments based on location of the property. The table shows summary statistics for the returns earned, holding period, and going-in capitalization rates for investments made by public pension funds in the analysis sample. The returns are calculated using a property-level panel for properties that are held at least 1 year using actual transaction prices and include property NOI, assumed to be flat over the holding period, where available.

Location	Variable	N	Mean	SD	Std Err	Min	P1	Median	P99	Max
Home State	Return (%)	129	0.12	0.22	0.02	-0.51	-0.36	0.09	0.86	1.18
	Holding Period (Yr)	143	4.90	3.51	0.29	0.00	0.00	3.92	13.75	15.25
	Cap Rate (%)	42	0.06	0.01	0.00	0.03	0.03	0.05	0.09	0.09
Adjacent State	Return (%)	28	0.06	0.14	0.03	-0.23	-0.23	0.04	0.56	0.56
	Holding Period (Yr)	31	4.44	3.54	0.64	0.08	0.08	3.33	16.17	16.17
	Cap Rate (%)	13	0.06	0.01	0.00	0.05	0.05	0.06	0.08	0.08
Distant State	Return (%)	657	0.06	0.23	0.01	-0.78	-0.56	0.04	0.78	3.92
	Holding Period (Yr)	697	5.61	3.45	0.13	0.00	0.25	5.17	12.83	15.75
	Cap Rate (%)	197	0.07	0.01	0.00	0.03	0.03	0.07	0.10	0.10
Total	Return (%)	814	0.07	0.23	0.01	-0.78	-0.43	0.05	0.81	3.92
	Holding Period (Yr)	871	5.45	3.47	0.12	0.00	0.17	5.00	13.08	16.17
	Cap Rate (%)	252	0.06	0.01	0.00	0.03	0.03	0.06	0.10	0.10

Table 1.12: Return-Impact trade-off estimates for all pension fund CRE investments. This table shows the results from estimating the main difference-in-difference regression specification (Equation 1.4) on subsamples of investments based on their location in the realized capital appreciation return distribution. For example, column 1 shows estimated treatment effects for all investments in the bottom quartile while column 4 shows the estimates for all investments in the top quartile of returns. Each panel of the table shows the results using different estimation windows of 1-year (A), 2-years (B), and 4-years (C) pre- and post-investment. All regressions include zip code fixed effects, vintage x year fixed effects, and zip and county economic growth controls. Standard errors are clustered at the county level.

	(1)	(2)	(3)	(4)	(5)
Panel A: 1-Year Window					
Treated × Post	0.038*	0.009	0.027**	0.041**	0.017**
	(1.82)	(0.71)	(2.09)	(2.43)	(2.28)
Adj. R^2 Within	0.086	0.010	0.052	0.216	0.049
Clusters	51	46	57	52	201
Observations	366	436	390	398	4,950
Panel B: 2-Year Window					
Treated × Post	0.046**	0.024	0.026**	0.030	0.019***
	(2.05)	(0.94)	(2.22)	(1.51)	(2.63)
Adj. R^2 Within	0.083	0.064	0.026	0.184	0.051
Clusters	54	47	57	50	204
Observations	619	716	618	626	7,790
Panel C: 3-Year Window					
Treated × Post	0.051	0.018	0.011	0.047*	0.025**
	(1.66)	(0.61)	(0.92)	(1.79)	(2.57)
Adj. R^2 Within	0.058	0.066	0.006	0.148	0.049
Clusters	54	46	56	50	198
Observations	861	930	786	806	9,909
Panel D: 4-Year Window					
Treated × Post	0.045	0.014	0.016	0.052	0.035***
	(1.27)	(0.40)	(1.08)	(1.32)	(3.16)
Adj. R^2 Within	0.050	0.040	0.004	0.057	0.040
Clusters	54	45	49	41	189
Observations	1,099	1,122	838	774	11,021
Zip FE	Y	Y	Y	Y	Y
Vintage x Year FE	Y	Y	Y	Y	Y
Controls	Y	Y	Y	Y	Y
Return Quartile	1	2	3	4	N/A

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 1.13: Return-Impact trade-off estimates for home state investments. This table shows the results from estimating the main difference-in-difference regression specification (Equation 1.4) on subsamples of *home state* investments based on their location in the realized capital appreciation return distribution. For example, column 1 shows estimated treatment effects for all investments in the bottom quartile while column4 shows the estimates for all investments in the top quartile of returns. Each panel of the table shows the results using different estimation windows of 1-year (A), 2-years (B), and 4-years (C) pre- and post-investment. All regressions include zip code fixed effects, vintage x year fixed effects, and zip and county economic growth controls. Standard errors are clustered at the zip code level.

	(1)	(2)	(3)	(4)	(5)
Panel A: 1-Year Window					
Treated × Post	0.120	-0.006	0.008	0.016	0.020*
	(1.29)	(-0.35)	(0.22)	(0.50)	(1.80)
Adj. R^2 Within	0.084	-0.127	-0.094	-0.483	0.038
Clusters	8	7	14	12	64
Observations	76	60	97	68	1,190
Panel B: 2-Year Window					
Treated × Post	0.123	-0.025	0.031	0.057	0.033**
	(1.78)	(-0.73)	(1.15)	(1.63)	(2.27)
Adj. R^2 Within	0.081	0.010	-0.001	-0.018	0.027
Clusters	8	7	13	11	65
Observations	125	98	151	99	1,880
Panel C: 3-Year Window					
Treated × Post	0.161*	-0.008	0.011	0.098*	0.043**
	(2.11)	(-0.18)	(0.57)	(2.08)	(2.52)
Adj. R^2 Within	0.135	0.079	0.109	0.113	0.040
Clusters	8	7	13	11	65
Observations	174	138	177	118	2,430
Panel D: 4-Year Window					
Treated × Post	0.182*	0.023	-0.001	0.094	0.055***
	(2.19)	(0.43)	(-0.04)	(1.53)	(2.97)
Adj. R^2 Within	0.140	0.075	0.043	0.431	0.042
Clusters	8	7	10	7	63
Observations	219	170	184	90	2,627
Zip FE	Y	Y	Y	Y	Y
Vintage x Year FE	Y	Y	Y	Y	Y
Controls	Y	Y	Y	Y	Y
Return Quartile	1	2	3	4	N/A

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 1.14: Robustness test for the main results measuring employment spillovers from pension fund CRE investments. All of the below robustness tests are conducted using an estimation window that include 4 years before and after the investment event. Column 1 shows the main result from Table 1.3, Column 6 for reference. Column 2 re-estimates the main specification dropping all CRE transactions less than $5M (roughly the bottom 5% of transactions by size). Column 3 drops all transactions with transaction price greater than $500M (roughly the top 5% of transactions by size). Column 4 excludes all investments made by California pension funds (CalPERS and CalSTRS). Column 5 includes *only* investments made by California pensions. Column 6 uses a model estimated with additional time-varying zip code controls extracted from the American Community Survey. This reduces the sample size significantly because the ACS data is only available from 2011 - 2017. Overall, the results show the main estimates are stable across a variety of alternative samples and specifications.

	(1)	(2)	(3)	(4)	(5)	(6)
Treated × Post	0.035***	0.031***	0.035***	0.039***	0.031**	0.040***
	(3.17)	(2.85)	(3.18)	(4.02)	(2.01)	(3.64)
Adj. R^2 Within	0.036	0.033	0.037	0.033	0.046	0.126
Clusters	204	196	204	136	168	121
Observations	14,861	13,050	14,775	5,794	9,066	3,811
Zip FE	Y	Y	Y	Y	Y	Y
Vintage x Year FE	Y	Y	Y	Y	Y	Y
Controls	Y	Y	Y	Y	Y	Y
Window	+-4Yr	+-4Yr	+-4Yr	+-4Yr	+-4Yr	+-4Yr
Sample	Main	Price gt 5M	Price lt 500M	No CA	Only CA	Cty + Zip Ctrls

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

APPENDIX A: INVESTMENT POLICY QUOTES

The following quotes are hand collected from various sources listed next to the names of the public pension funds. The quotes indicate that public pension funds have additional investment objectives, that include spillovers on employment, in addition to the traditional financial risk-reward criteria. CalPERS CAFR 2017

> "While we are a global investor, CalPERS is also proud to make investments in California. The Fiscal Year 2015-16 CalPERS for California report showed $27.3 billion was invested in our home state, representing 9.3 percent of the PERF. These dollars were invested across multiple asset classes, including public equity, fixed income, private equity, and real assets. These commitments support local jobs, contribute to major infrastructure projects, and support business expansion efforts."

CalSTRS California Investment Policy (adopted October 2001)

> "While the exclusive purpose of any investment is to achieve the desired return, at a prudent level of risk, and achieving proper diversification, the Committee recognizes that many investment activities may have the ancillary benefit of creating economic value and activity that benefit the state and its citizens. Therefore, within the investment activity of each asset class, if all things are equal, especially in regards to risk, return, and diversification, CalSTRS will give preference to investments focused or based in California."

Alabama ERS Investment Policy (2018)

> "...ERS recognizes that a stronger Alabama equates to a stronger Employee Retirement System, and as such, investments in Alabama businesses are encouraged to the extent the investment return meets the criteria delineated by this policy statement. Any Alabama investment must be forecast to have a return comparable to other investments in the same asset class."

Iowa PERS (CAFR 2018)

From the section outlining the Investments in Iowa policy. IPERS is authorized to invest money in accordance with general investment policy rules but can also invest “in a manner that will enhance the economy of the state, and in particular, will result in increased employment of the residents of the state."

MassPRIM Investment Policy Document

“PRIM recognizes its obligations under Massachusetts law to seek investment opportunities that will benefit the economic climate of the Commonwealth as a whole, provided that such investments are consistent with PRIM’s obligations to the members and beneficiaries of its participating retirement systems. (See M.G.L. ch. 32, sec. 23(2A)(h)) Accordingly, in cases where investment characteristics, including returns, risk, liquidity, compliance with allocation policy, and others, are equal, PRIM will favor those investments with a substantial, direct and measurable benefit to the economy of the Commonwealth."

New York State Common Retirement Fund (Website)

“Whenever possible, the Comptroller guides the Fund to invest in New York-based business ventures, companies and other programs that spur economic growth and create and retain jobs. The Fund...invests in commercial real estate properties."

APPENDIX B: ADDITIONAL TABLES

Table B.1: Comparison of the sample pension fund assets, liabilities, and real estate allocation to those of public pension plans not included in the sample. The public pensions in my sample represent, on average, 56% of total assets, 54% of total liabilities, and 68% of total real estate assets.

Year	Assets ($Bn) All PFs	Assets ($Bn) Sample PFs	%	Liabilities ($Bn) All PFs	Liabilities ($Bn) Sample PFs	% %	Real Estate ($Bn) All PFs	Real Estate ($Bn) Sample PFs	%
2001	2122	1216	57%	2080	1163	56%	87	66	76%
2002	2184	1192	55%	2299	1236	54%	92	66	72%
2003	2185	1190	54%	2449	1315	54%	88	63	71%
2004	2279	1259	55%	2606	1397	54%	88	63	71%
2005	2373	1333	56%	2774	1499	54%	97	66	69%
2006	2523	1426	56%	2957	1594	54%	121	83	69%
2007	2739	1554	57%	3168	1713	54%	147	102	69%
2008	2835	1610	57%	3353	1810	54%	190	130	69%
2009	2764	1560	56%	3527	1909	54%	173	116	67%
2010	2805	1594	57%	3698	2008	54%	166	114	69%
2011	2867	1636	57%	3854	2103	55%	192	130	68%
2012	2894	1658	57%	3996	2179	55%	227	154	68%
2013	2993	1713	57%	4158	2275	55%	235	157	67%
2014	3198	1834	57%	4361	2387	55%	243	159	66%
2015	3353	1918	57%	4574	2507	55%	271	178	66%
2016	3317	1917	58%	4605	2576	56%	299	197	66%
2017	3112	1672	54%	4267	2212	52%	242	147	61%
Column Average	2738	1546	56%	3454	1876	54%	174	117	68%

Table B.2: Comparison of the sample pension fund asset allocations and those of public pension plans that are not included in the sample. The portfolio allocation data come from the Public Plans Database that extracts the information from the annual reports of US public pension plans. Overall, the sample plans have a 1.4% lower portfolio allocation to fixed income ($p < 0.01$), a 1.5% larger allocation to real estate ($p < 0.01$), a 3.1% lower allocation to hedge funds ($p < 0.01$), and a 0.4% larger cash holdings ($p < 0.01$).

	Non-Sample Pensions	Sample Pensions	Difference	t-statistic (uneq.)
Equity	53.5%	53.8%	-0.3%	-0.63
	1930	640		
Fixed Income	27.8%	26.4%	1.4%	3.62
	1937	640		
Real Estate	7.0%	8.5%	-1.5%	-8.31
	1438	532		
Private Equity	7.6%	8.0%	-0.3%	-1.14
	1279	502		
Hedge Funds	9.2%	6.1%	3.1%	7.67
	952	189		
Cash	2.3%	2.7%	-0.4%	-2.95
	1462	471		

Table B.3: Comparison of the sample pension fund asset returns and those of public pension plans that are not included in the sample. While the portfolio allocations may differ for several asset classes across pensions (shown in the previous table), the returns earned by the sample pension funds only differ by +1.6% for private equity investments ($p < 0.01$). Returns for all other asset classes are not statistically different.

	Non-Sample Pensions	Sample Pensions	Difference	t-statistic (uneq.)
Equity	7.3%	6.6%	0.7%	0.91
	1611	567		
Fixed Income	5.9%	5.8%	0.1%	0.31
	1540	580		
Real Estate	8.8%	9.7%	-0.8%	-1.22
	1200	500		
Private Equity	9.4%	11.0%	-1.6%	-2.00
	991	456		
Hedge Funds	4.9%	5.0%	-0.1%	-0.14
	621	230		
Cash	1.8%	2.1%	-0.3%	-1.09
	672	269		

Table B.4: 2-digit NAICS codes from the US Bureau of Labor Statistics. The table shows the 2-digit NAICS code classifications used to classify zip code employment into service-providing and goods-producing supersectors. The dependent variables, $ln(ServiceEmp)$ and $ln(GoodsEmp)$, are created by taking the natrual logarithm of the sum of employment at firms in the Service-Providing and Goods-Producing supersectors for each zip code.

Panel A: Service-Providing Industries		
Supersector	Sector	NAICS
Trade, Transportation, and Utilities	Wholesale Trade	42
Trade, Transportation, and Utilities	Retail Trade	44-45
Trade, Transportation, and Utilities	Transportation and Warehousing	48-49
Trade, Transportation, and Utilities	Utilities	22
Information	Information	51
Financial Activities	Finance and Insurance	52
Financial Activities	Real Estate and Rental and Leasing	53
Professional and Business Services	Professional, Scientific, and Technical Services	54
Professional and Business Services	Management of Companies and Enterprises	55
Professional and Business Services	Administrative and Support and Waste Management and Remediation Services	56
Education and Health Services	Educational Services	61
Education and Health Services	Health Care and Social Assistance	62
Leisure and Hospitality	Arts, Entertainment, and Recreation	71
Leisure and Hospitality	Accomodation and Food Services	72
Other Services (except Public Administration)	Other Services (except Public Administration)	81
Panel B: Goods-Producing Industries		
Supersector	Sector	NAICS
Natural Resources and Mining	Agriculture, Forestry, Fishing, and Hunting	11
Mining, Quarrying, and Oil and Gas Extraction	Mining, Quarrying, and Oil and Gas Extraction	21
Construction	Construction	23
Manufacturing	Manufacturing	31-33

Table B.5: Estimates for leads-lags models (Falsification Test of DD Framework). Each column in the table shows the estimated coefficients for a leads-lags model with 4 leads and 4 lags for each of the dependent variables studied in the paper. The baseline is the year before treatment, year $t-1$. Overall, the estimated coefficients before treatment do not differ statistically from zero.

	(1) ln(Emp)	(2) ln(Service Emp)	(3) ln(Goods Emp)	(4) ln(Small Biz Emp)	(5) ln(Big Biz Emp)	(6) ln(Est)	(7) Zip Invt by Others ($)	(8) Cty Invt by Others ($)	(9) ln(Wage per Worker)
Treated $\times$ $t-4$	0.004	0.001	-0.019	-0.009	0.003	-0.007	-33.920	1.772	0.002
	(0.34)	(0.14)	(-0.95)	(-1.27)	(0.24)	(-1.06)	(-1.24)	(0.02)	(0.21)
Treated $\times$ $t-3$	0.018*	0.008	0.007	-0.000	0.005	0.001	-33.060	-60.848	-0.000
	(1.80)	(0.89)	(0.44)	(-0.02)	(0.53)	(0.12)	(-1.65)	(-0.72)	(-0.03)
Treated $\times$ $t-2$	0.003	-0.002	0.006	-0.006*	0.001	-0.006*	-26.187	42.487	0.002
	(0.55)	(-0.39)	(0.48)	(-1.90)	(0.10)	(-1.95)	(-1.65)	(0.55)	(0.51)
Treated $\times$ t	0.017**	0.014**	-0.014	0.005*	0.015**	0.005*	8.581	74.598	0.005
	(2.33)	(2.54)	(-1.25)	(1.75)	(2.24)	(1.87)	(0.86)	(1.10)	(1.16)
Treated $\times$ $t+1$	0.035***	0.036***	-0.002	0.012***	0.027***	0.013***	21.896*	8.885	0.008
	(3.71)	(5.04)	(-0.10)	(3.26)	(3.19)	(3.35)	(1.96)	(0.10)	(1.34)
Treated $\times$ $t+2$	0.042***	0.042***	0.003	0.020***	0.034***	0.020***	19.053	124.994	0.005
	(4.39)	(4.78)	(0.17)	(3.69)	(3.28)	(3.74)	(1.39)	(1.14)	(0.87)
Treated $\times$ $t+3$	0.049***	0.040***	0.007	0.023***	0.032**	0.023***	11.699	-93.988	0.004
	(3.59)	(3.89)	(0.29)	(3.28)	(2.47)	(3.36)	(0.81)	(-1.10)	(0.67)
Treated $\times$ $t+4$	0.064***	0.052***	0.020	0.025***	0.044***	0.027***	28.524**	19.221	0.002
	(3.85)	(3.88)	(0.92)	(2.98)	(2.85)	(3.23)	(2.43)	(0.24)	(0.31)
Adj. R^2 Within	0.04	0.03	0.01	0.02	0.02	0.02	0.02	0.31	0.01
Clusters	204	204	204	204	203	204	204	204	204
Observations	14,861	14,568	14,552	14,568	14,544	14,874	14,833	14,874	14,861
Zip FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Vintage x Year FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Controls	Y	Y	Y	Y	Y	Y	Y	Y	Y

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table B.6: Pension fund transactions make up most of the $ volume in the zip codes in which they invest. This table shows the investments made by pension funds relative to the investments made in the same zip codes by other institutional investors. Comparing the numbers in this table versus the previous table shows that the pension funds are very important players in the local real estate capital markets. Their investments can be interpreted as a large shock to the zip codes in which they invest. Of this sample of zip codes, pension fund investments represent the entire investment in the zip code in 38% of observations and pension fund investments that represent at least 75% of total investment in 50% of observations.

Year	N PF Investments	PF Volume ($)	Mean PF Investment ($)	Total Volume ($)	Pct PF Volume
2001	69	3684.59	53.40	7909.05	47%
2002	49	2691.24	54.92	4406.38	61%
2003	39	3168.01	81.23	5946.03	53%
2004	52	2380.21	45.77	5952.89	40%
2005	182	8321.14	45.72	25016.99	33%
2006	124	5819.84	46.93	22131.76	26%
2007	108	7951.94	73.63	29278.41	27%
2008	55	2335.88	42.47	4200.99	56%
2009	97	1966.19	20.27	2962.83	66%
2010	69	3119.78	45.21	5116.12	61%
2011	61	3091.42	50.68	8409.71	37%
2012	50	4495.11	89.90	12380.87	36%
2013	35	4420.99	126.31	9695.92	46%
2014	60	4773.66	79.56	14062.14	34%
2015	33	1879.74	56.96	7735.43	24%
2016	36	5545.67	154.05	22241.88	25%
2017	27	2702.18	100.08	7967.83	34%
2018	32	11544.41	360.76	27992.31	41%
Grand Total	1178	79892		223407.54	36%

Table B.7: Panel regression to predict the location choice of pension fund investments. The dependent variable is an indicator that equals 1 for the year when a pension fund invests in CRE in a given zip code. Multiple investments in a given zip code are aggregated. The panel starts with 40,854 zip codes per year from 2001 to 2018 resulting in 735,372 observations. The sample size diminishes significantly to (183,899 observations or fewer; about 12,000 zip codes per year) because I only keep zip codes with employment data that is not suppressed for the full sample period, all controls are trimmed at the 1%-level, and must have non-missing data. Fixed effects for Year, County, and Zip are included as noted in the table. All standard errors are clustered at the county level.

$$\mathbb{1}(PFInvt)_{z,c,t} = \beta_0 + \beta_1 X_{z,t-2}^{zip} + \beta_2 X_{c,t-2}^{county} + \beta_3 X_{t-2}^{mkt} + \delta_z + \gamma_c + \theta_t + \varepsilon_{z,c,t} \tag{5}$$

	(1) $\mathbb{1}(PFInvt)$	(2) $\mathbb{1}(PFInvt)$	(3) $\mathbb{1}(PFInvt)$	(4) $\mathbb{1}(PFInvt)$
$\ln(Emp)_{z,t-2}$	0.003***	0.003***	0.003***	0.001
	(10.05)	(10.00)	(9.31)	(0.50)
$\Delta(Emp)_{z,t-3,t-2}$	-0.003**	-0.003**	-0.003**	-0.003**
	(-2.57)	(-2.51)	(-2.38)	(-2.42)
$\Delta(HPI)_{z,t-3,t-2}$	0.004	-0.006	-0.003	-0.004
	(1.01)	(-1.48)	(-0.64)	(-0.77)
$\Delta(Pop)_{c,t-3,t-2}$	0.029	0.019	-0.037	-0.036
	(1.27)	(0.85)	(-1.34)	(-1.30)
$\Delta(Wage)_{c,t-3,t-2}$	0.017**	0.005	0.009	0.009
	(2.12)	(0.65)	(1.02)	(1.05)
$\Delta(Emp)_{c,t-3,t-2}$	0.000	0.000	0.000	0.000
	(0.07)	(0.06)	(1.00)	(1.16)
$ln(\$Invt)_{t-2}$	0.001***	0.001***	0.000	0.000
	(7.75)	(8.27)	(0.83)	(0.90)
$NInvt_{t-2}$	0.000	0.000*	-0.000	-0.000
	(1.30)	(1.95)	(-1.16)	(-1.14)
$NCREIF_{t-3,t-2}$	-0.006**	-0.017	-0.005	-0.004
	(-2.33)	(-1.13)	(-0.47)	(-0.30)
Adj R^2	0.01	0.01	0.01	0.03
Clusters	1247	1247	1247	1247
Observations	155,769	155,769	155,769	155,769
Year FE		Y	Y	Y
County FE			Y	Y
Zip FE				Y
SE Cluster Cty	Y	Y	Y	Y

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table B.8: Nominal appreciation returns to CRE investments, by investor, *excluding* NOI. The table shows the annualized returns for all investors listed as Institutional, Private, or Public that have at least 40 round-trip transactions in the data. The returns are calculated using a property-level panel for properties that are held at least 1 year. The returns are calculated using actual transaction prices only. The Sharpe Ratios are calculated taking the average yield on 5-year treasuries over the sample period from 2001-2018 to match with the average holding period of about 5 years.

Investor	N	Mean Return	StDev Return	SE Mean	Min	Median	Max	Sharpe Ratio (5Yr Treasury)	Mean Hold (Yr)	Mean Cap Rate
Developer/Owner/Operator	6473	0.155	0.571	0.007	-1.000	0.061	27.519	0.225	5.1	0.069
Equity Fund	9291	0.138	0.457	0.005	-0.923	0.070	19.072	0.246	4.5	0.068
Finance	279	0.114	0.331	0.020	-0.493	0.055	2.834	0.264	4.3	0.073
Insurance	791	0.096	0.492	0.018	-0.340	0.015	7.089	0.143	5.3	0.070
REOC	163	0.096	0.406	0.032	-0.615	0.049	4.205	0.172	5.1	0.067
Non-US Pension Fund	471	0.093	0.537	0.025	-0.611	0.029	9.991	0.124	6.2	0.066
Investment Manager	596	0.092	0.340	0.014	-0.746	0.034	4.080	0.193	5.3	0.068
Bank	7116	0.088	0.394	0.005	-0.840	0.036	11.000	0.157	5.6	0.069
US Public Pension Fund	814	0.060	0.229	0.008	-0.784	0.032	3.921	0.147	5.8	0.068
Non Traded REIT	374	0.057	0.429	0.022	-0.540	0.011	6.131	0.072	6.6	0.073
Sovereign Wealth Fund	61	0.045	0.269	0.034	-0.476	-0.007	1.217	0.069	3.9	0.051
REIT	1680	0.033	0.228	0.006	-0.866	0.002	2.813	0.031	6.3	0.073

Table B.9: Geographic distribution of CRE transactions for all investors and for US public pension funds. The table below shows the number of investments and percent of investments made in each state (i.e. equally weighted) for all CRE transactions (columns 2 and 3) compared to the CRE transactions made by US public pension funds (columns 4 and 5). Column 6 calculates the difference in the percentage of deals conducted in each state by subtracting the percent of all transactions (benchmark) from the percent of pension fund transactions. On average, the geographic allocations are similar for PFs relative to other investors.

State	N	Percent N	N PF	Percent N PF	Difference (PF - All)
AL	675	0.7%	4	0.2%	-0.5%
AK	23	0.0%	1	0.1%	0.0%
AZ	3266	3.4%	34	2.0%	-1.4%
AR	208	0.2%	2	0.1%	-0.1%
CA	16647	17.5%	364	21.4%	3.9%
CO	2770	2.9%	38	2.2%	-0.7%
CT	776	0.8%	9	0.5%	-0.3%
DE	157	0.2%	3	0.2%	0.0%
DC	981	1.0%	14	0.8%	-0.2%
FL	8303	8.7%	112	6.6%	-2.1%
GA	4784	5.0%	68	4.0%	-1.0%
HI	379	0.4%	7	0.4%	0.0%
ID	102	0.1%	0	0.0%	-0.1%
IL	5104	5.4%	146	8.6%	3.2%
IN	1142	1.2%	20	1.2%	0.0%
IA	171	0.2%	5	0.3%	0.1%
KS	463	0.5%	8	0.5%	0.0%
KY	519	0.5%	4	0.2%	-0.3%
LA	354	0.4%	3	0.2%	-0.2%
ME	83	0.1%	0	0.0%	-0.1%
MD	2174	2.3%	43	2.5%	0.2%
MA	2673	2.8%	22	1.3%	-1.5%
MI	1289	1.4%	30	1.8%	0.4%
MN	1379	1.4%	42	2.5%	1.0%
MS	188	0.2%	1	0.1%	-0.1%
MO	1159	1.2%	13	0.8%	-0.5%
MT	22	0.0%	0	0.0%	0.0%
NE	152	0.2%	1	0.1%	-0.1%
NV	1543	1.6%	16	0.9%	-0.7%
NH	144	0.2%	2	0.1%	0.0%
NJ	2397	2.5%	79	4.6%	2.1%
NM	279	0.3%	0	0.0%	-0.3%
NY	6222	6.5%	105	6.2%	-0.4%
NC	3137	3.3%	51	3.0%	-0.3%
ND	42	0.0%	0	0.0%	0.0%
OH	2074	2.2%	33	1.9%	-0.2%
OK	471	0.5%	3	0.2%	-0.3%
OR	967	1.0%	22	1.3%	0.3%
PA	2273	2.4%	33	1.9%	-0.4%
RI	120	0.1%	1	0.1%	-0.1%
SC	967	1.0%	15	0.9%	-0.1%
SD	26	0.0%	0	0.0%	0.0%
TN	1678	1.8%	35	2.1%	0.3%
TX	10346	10.9%	156	9.2%	-1.7%
UT	534	0.6%	5	0.3%	-0.3%
VT	33	0.0%	0	0.0%	0.0%
VA	2744	2.9%	60	3.5%	0.6%
WA	2556	2.7%	65	3.8%	1.1%
WV	67	0.1%	0	0.0%	-0.1%
WI	724	0.8%	28	1.6%	0.9%
WY	20	0.0%	0	0.0%	0.0%
Total	95307	100.0%	1703	100.0%	0.0%
Mean	1869	2.0%	33	2.0%	0.0%
Median	776	0.8%	13	0.8%	-0.1%
St Dev.	2998	3.1%	60	3.5%	1.0%

Table B.10: Geographic distribution of CRE transactions for all investors and for US public pension funds. The table below shows the dollar value (billions) of investments and percent of investments made in each state (i.e. value weighted) for all CRE transactions (columns 2 and 3) compared to the CRE transactions made by US public pension funds (columns 4 and 5). Column 6 calculates the difference in the percentage of deals conducted in each state by subtracting the percent of all transactions (benchmark) from the percent of pension fund transactions. On average, the geographic allocations are similar for PFs relative to other investors.

State	$ (Bn)	Percent $	$ PF (Bn)	Percent $ PF	Difference (PF - All)
AL	12.2	0.4%	0.0	0.0%	-0.4%
AK	0.4	0.0%	0.0	0.0%	0.0%
AZ	75.7	2.4%	1.7	1.8%	-0.6%
AR	2.9	0.1%	0.0	0.0%	-0.1%
CA	612.4	19.7%	19.0	20.5%	0.8%
CO	82.0	2.6%	2.0	2.2%	-0.5%
CT	19.7	0.6%	0.5	0.6%	-0.1%
DE	4.4	0.1%	1.1	1.2%	1.0%
DC	84.1	2.7%	1.2	1.3%	-1.4%
FL	215.1	6.9%	4.0	4.3%	-2.6%
GA	113.0	3.6%	2.5	2.6%	-1.0%
HI	41.6	1.3%	5.1	5.5%	4.2%
ID	1.1	0.0%	0.0	0.0%	0.0%
IL	158.0	5.1%	6.7	7.2%	2.1%
IN	18.0	0.6%	0.4	0.4%	-0.2%
IA	1.4	0.0%	0.1	0.1%	0.0%
KS	7.5	0.2%	0.1	0.2%	-0.1%
KY	8.2	0.3%	0.2	0.2%	0.0%
LA	8.3	0.3%	0.1	0.1%	-0.2%
ME	1.6	0.1%	0.0	0.0%	-0.1%
MD	67.5	2.2%	2.0	2.2%	0.0%
MA	126.9	4.1%	2.0	2.1%	-2.0%
MI	17.9	0.6%	0.7	0.8%	0.2%
MN	30.8	1.0%	0.9	1.0%	0.0%
MS	3.7	0.1%	0.0	0.0%	-0.1%
MO	18.8	0.6%	0.8	0.9%	0.3%
MT	0.3	0.0%	0.0	0.0%	0.0%
NE	2.5	0.1%	0.0	0.0%	0.0%
NV	49.2	1.6%	1.3	1.4%	-0.2%
NH	3.1	0.1%	0.1	0.1%	0.0%
NJ	70.2	2.3%	2.3	2.5%	0.2%
NM	3.8	0.1%	0.0	0.0%	-0.1%
NY	533.9	17.1%	14.9	16.0%	-1.1%
NC	62.8	2.0%	1.3	1.4%	-0.6%
ND	0.8	0.0%	0.0	0.0%	0.0%
OH	29.5	0.9%	0.6	0.6%	-0.3%
OK	5.9	0.2%	0.1	0.1%	-0.1%
OR	28.8	0.9%	0.7	0.7%	-0.2%
PA	55.0	1.8%	1.6	1.7%	-0.1%
RI	2.9	0.1%	0.0	0.0%	-0.1%
SC	15.0	0.5%	0.4	0.4%	0.0%
SD	0.2	0.0%	0.0	0.0%	0.0%
TN	30.5	1.0%	0.8	0.8%	-0.1%
TX	273.1	8.8%	10.6	11.4%	2.6%
UT	10.3	0.3%	0.2	0.3%	-0.1%
VT	0.9	0.0%	0.0	0.0%	0.0%
VA	99.7	3.2%	2.5	2.7%	-0.5%
WA	94.5	3.0%	4.0	4.3%	1.3%
WV	1.0	0.0%	0.0	0.0%	0.0%
WI	9.2	0.3%	0.4	0.5%	0.2%
WY	0.2	0.0%	0.0	0.0%	0.0%
Total	3116.6	100.0%	92.8	100.0%	0.0%
Mean	61.1	2.0%	1.8	2.0%	0.0%
Median	17.9	0.6%	0.5	0.6%	-0.1%
St Dev.	119.1	3.8%	3.7	3.9%	1.0%

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