The Journal of Real Estate Finance and Economics
https://doi.org/10.1007/s11146-021-09864-y

# Does Debt Management Matter for REIT Returns?

**Zhilan Feng[1] · Stephen M. Miller[2] · Dogan Tirtiroglu[3]**

Accepted: 31 August 2021


## Abstract

Asset and debt management are two essential managerial tasks in any firm. The traditional view holds that asset management is the primary driver of real estate investment trust (REIT) returns for the following reasons: (1) interest tax shields are not a source of incremental value for REITs and (2) the plain tangibility of real estate assets helps to diminish the financial distress costs of REITs. This paper examines empirically whether debt management also matters for the operating returns (i.e., ROA, ROE, ΔROA or ΔROE) of a portfolio of REITs. Both applying a novel dynamic decomposition method to ΔROA or ΔROE and also defining ROA and ROE under the net income and the funds from operations metrics guide the empirical approach of this paper. Our findings show that the effects of debt management on REITs' operating profitability cannot be ruled out. However, the direction of these effects appears to be opposite to that of asset management. These results call for renewed and further investigations into the optimal capital structure questions for REITs.

**Keywords** Asset and debt management · REIT · ROA and ROE · Dynamic decomposition · FFO and NI

✉ Dogan Tirtiroglu
dtirtiroglu@ryerson.ca

Zhilan Feng
zfeng@clarkson.edu

Stephen M. Miller
stephen.miller@unlv.edu

1 Economics & Financial Studies, Clarkson University, The David D. Reh School of Business, Capital Region Campus, 80 Nott Terrace, Schenectady, NY 12308, USA

2 Economics, University of Nevada, Las Vegas, Las Vegas, NV 89154-6005, USA

3 Real Estate Management Department, Ryerson University, Ted Rogers School of Management, Toronto, ON M5G 2C3, Canada

Published online: 06 January 2022

## Introduction

Asset and debt management are two essential managerial tasks in any firm. Whether managers can create incremental value through debt management practices has been a long-standing and one of the most debated topics in Finance. Modigliani and Miller (MM) (1958) demonstrate in their path-breaking paper that, under a set of highly restrictive assumptions, including the absence of corporate taxes, and when the no-arbitrage condition is invoked, debt management alone is not capable of creating any incremental value. They attribute value creation solely on asset management in this tightly defined economic environment. The ensuing rich literature has offered various ways, through mainly relaxing the restrictive assumptions, by which debt management can add incremental firm value. A crucial source of incremental value from debt financing stems from the tax deductibility of interest expense in a more realistic world with taxation of corporate profits (MM, 1963; Graham, 2000; Graham and Harvey, 2001). Parsons and Titman (2008) and Graham and Leary (2011) cover the pertinent literature. Building on these contributions, especially those by MM (1958, 1963), Myers (1974) formulates the Adjusted Present Value (APV) method, which prescribes a two-stage decision-making process for the levered asset valuations or capital budgeting projects: find (i) the value of the proposed project as if it were an all-equity financed project (i.e., pure asset management value) and (ii) all incremental value(s) from debt financing effects and add them to that in (i). This method reveals remarkably that a proposed project that may be rejected under all-equity financing can become acceptable once incremental values from debt financing effects are added to the value arrived under all-equity financing.

Given this background, we study empirically whether debt management matters for REIT returns. REITs provide at least three unique angles in exploring this question. First, the legal framework that defines REITs exempts them from paying corporate taxes for as long as they pay the minimum of a legally binding percentage of their cash flows in dividends. Thus, samples of REITs embrace naturally MM's (1958) crucial assumption of "no taxes" (see Howe and Shilling, 1988). The no-taxes status suggests that asset management may be the only determinant of REITs' returns. Second, lessened default risk and financial distress costs, arising from asset tangibility, make Equity REITs'[1] access to debt markets better and easier (Glover, 2016; Reindl et al., 2017; among others). This comparative advantage may motivate REIT managers to take debt management for granted. In spite of the industry's observed large appetite for using debt financing, financial distress does not appear to be a factor for debt management to affect REIT returns. Thus, the static trade-off theory of capital structure exempts REITs from its coverage. Third, REITs are, at least in theory, a pass-through investment vehicle that routinely use a lot of long-term leverage. These characteristics, combined with reliable data availability, uniquely permit the separation of the asset- and debt-management functions. In our view, no other pass-through investment vehicle can

[1] While Equity REITs own and operate income-producing properties, Mortgage REITs invest in mortgages and mortgage related securities.

offer an insight into this separation. Mutual funds offer rich data, but they do not use significant leverage. Hedge funds, some private equity funds, some CDOs, and some CDSs use leverage, but they offer little or no public data.[2] Thus, studying REITs permits us to address a question fundamental to both Finance and Real Estate.

Three ingredients shape our empirical approach. First, we take a portfolio (or industry) approach and focus initially on the return on assets (ROA) and the return on equity (ROE) of the portfolio. While ROA is mainly a measure of asset management, ROE is an amalgam measure of both asset management and debt management. The annually-constructed value-weighted portfolio comprises of a sample of listed U.S. Equity REITs between 1989 and 2015. By comparing the magnitude and significance levels of the coefficient estimates for the portfolio's ROA, ROE, *change in ROA* (ΔROA) or *change in ROE* (ΔROE) in our models, we are able to infer whether REITs' debt management policies matter to their operating profitability. Second, Bennet's (1920) dynamic decomposition method helps us to explore this question further and from a relatively novel perspective. This method separates the portfolio's ΔROA or ΔROE, between time (t-1) and (t), into those that originate from (i) improved profitability of surviving individual REITs (the "within" effect), (ii) shifts of resources from less to more profitable surviving REITs (the "between or reallocation" effect), (iii) entries of REITs (the "entry" effect), and (iv) exits of REITs (the "exit" effect), respectively. Given that mismanagement or ineffective debt management may be the sources of exits and that the entrants may face some initial constraints in accessing the debt markets, empirical results, especially on the Bennet effects of the survivors, should add some depth to the results from the first set of estimations. Third, the recent literature on REITs debates comparatively the benefits and pitfalls of using net income (NI) or funds from operations (FFO). While emerging evidence favors the use of FFO,[3] this debate is still evolving and currently missing evidence at the portfolio level. We define ROA and ROE in terms of both NI and FFO and study their differential effects on the empirical results. Certainly, the addition, among others, of depreciation expense at time t to a REIT's NI(t) in measuring its FFO(t) relates to the management of depreciation expenses and hence asset management.[4]

The two-stage structure of Myers' (1974) APV model prescribes some empirically testable relations. The first set of time-series estimations examines the relation between the current and own lagged values across each of these four profitability measures: ROA, ROE, ΔROA, and ΔROE. Any statistical significance of the coefficient estimates of the own lags and their magnitudes could reveal whether the observed significance relates to the sample firms' asset- or debt-management policies or both.

[2] We thank an anonymous referee for this excellent point.

[3] *The National Association of Real Estate Investment Trusts* (*NAREIT*) in the United States for a long time and *REALPAC* in Canada in recent years have promoted the use of FFO.

[4] Other FFO adjustments, such as including a REIT's interest in unconsolidated partnerships and joint ventures, and adding back interest expense on convertible debt (some REITs treat convertible debt as equity), also suggest that FFO might be a more comprenhensive performance measure to asset management policies.

The second set of time-series estimations supplements the initial analyses by replacing the own-lags above with the lags of the Bennet effects in the estimation models. To our knowledge, examining financial data, by focusing on the Bennet effects that make up the temporal change in a profitability measure, is new in the literature. If the first set of estimations above detects statistical significance, then this supplementary extension can reveal which Bennet effect(s) may be the source(s) of the initially observed significance in the own lags. These additional estimations are useful in at least two ways. First, findings of lack of significance in the first set of analyses and then of significance in the second set would suggest that some significant underlying relations either stay invisible or wash out in the first set of estimations. Second, an understanding of the source(s) of significant relation(s) between any of the dependent variables and the lagged Bennet effects should be useful to the (i) REIT managers in managing their assets and debt contracts, (ii) investors in their investment or portfolio rebalancing decisions, and (iii) policy-makers in dispensing their oversight duties of this sufficiently regulated sector.

Our main findings indicate that the sample Equity REITs' asset management policies, as expected, exert considerably more influence than debt management policies on REITs' operating returns, and that debt management still surfaces as a source of incremental value, pulling down the positive value created by asset management. This result is consistent with the observation that some pressure factors, which are to motivate managers for better and more intense debt management, are missing in REITs' environment. Further, the Bennet "within" effect dominates other Bennet effects in our analyses; the use of the FFO measure, along with the "within" effect, helps to identify asset management's more pronounced role in generating REITs' operating profits; and the FFO results differ from their NI measure counterparts even at the portfolio level.

This paper unfolds as follows. The following two sections (i) provide a literature review and develop hypotheses, and (ii) introduce the Bennet dynamic decomposition, leaving its details to an appendix. The next two discuss (i) the data and the sample, and (ii) specify the empirical models and report the findings. The final section concludes the paper and offers ideas on how to apply the Bennet decomposition to some other financial data.

## Literature Review and Development of Hypothesis

This section covers the pertinent literature on asset management and debt management and the NI and FFO measures and postulates some empirically testable hypotheses. The Bennet decomposition is deferred to Section 3; it requires algebraic formulations and their explanations.

Firms produce their profits by managing their portfolios of assets and liabilities. A literature search does not generate any published papers on how asset- or debt-management policies may affect either stock returns or operating profitability in the REIT industry. A few papers consider REITs' firm-level operating performance. Harrison et al. (2011) report that enhanced liquidity strongly associates with better firm-level operating performance. Ghosh et al. (2013) find improvements in industry-adjusted operating performance prior to a seasoned equity offering and declines in operating cash-flow measures after the offering. They attribute this mean reverting behavior to asymmetric information. Huang et al. (2009) find that operating performance of REITs peak at the announcement year and decline in the years that follow the announcement and that post-buyback operating performance is stronger than its pre-buyback counterpart. Xu and Ooi (2018) consider whether the growth of REITs over the last two decades relates to the existence of scale economies. They find that large REITs with more free cash flows have a higher propensity to engage in bad growth activities. Beracha et al. (2019) show empirically that (i) operational performance (i.e., ROA and ROE) negatively associates with previous-year operational efficiency (i.e., the ratio of operational expenses to revenue) suggesting that more efficient REITs generate better operating results, (ii) more efficient REITs have lower levels of credit risk and total risk, and (iii) operational efficiency partially explains the cross-sectional stock return of REITs. While Beracha et al. (2019) focus on ROA and ROE, they do not pursue the asset and debt management implications of these measures.

Myers' (1974) APV method is helpul in developing empirically testable relations. So, a brief coverage of its structure should be useful here. The APV method is one of at least three approaches to asset valuation or capital budgeting problems under debt financing and maximizes total assets. To start, consider a project or asset financed under 100% equity financing. That is,

$$APV = NPV_{AE} \tag{1.a}$$

where $NPV_{AE}$ indicates, in a capital budgeting context, the net present value of the all-equity financed project or firm. Pure asset management (i.e., that without any interference from debt financing) is the sole driver of this equation. Now consider the same project's valuation under debt financing. Incremental values from debt financing effects enter into Equ. (1.a). That is,

$$APV = NPV_{AE} + NPVF \tag{1.b}$$

where NPVF indicates all incremental values that can originate from debt financing. The NPVF may be a sum of a series of value calculations that can originate from debt financing.[5]

Following MM (1958) and Myers (1974), REITs' exemption from corporate taxes leads to the prediction that debt management is either not relevant or less relevant than asset management. This prediction receives support from the view that financial distress costs may be a less important leverage consideration for REIT managers. Commercial real estate assets in REITs' portfolios are visible and serve as collateral in their borrowing deals. Thus, asset tangibility is readily available for REITs, giving the managers a venue to relax on financial distress and its costs and ultimately on debt management. Industry observers' views concur with the prediction that asset management is the main driver of REITs' returns.

[5] Inselbag and Kaufold (1989) provide an excellent demonstration of the APV method with a numerically driven example of a leveraged corporate buyout. The Flow-to-Equity (FTE) and the Weighted Average Cost of Capital methods are the alternatives to the APV method. For capital budgeting or asset valuation problems without cash flow related complications, all three methods provide the same result.

Meanwhile, intensity of debt is one of the key observed characteristics of the REIT industry. Thus, other debt management effects, such as those arising from agency problems (see, e.g., Jensen and Meckling, 1976), asymmetric information (see, e.g., Myers and Majluf, 1984), labor market dynamics (see Berk et al., 2010; Chemmanur et al., 2013; Kim, 2020; Matsa, 2010, among others), and/or product/input market interactions (see, e.g., Brander and Lewis, 1986), make REITs' debt management relevant, potentially as relevant as their asset management. Which of the two management tasks dominates the other and whether debt management adds any incremental value are empirical matters and also the focus of this paper.

The literature on REITs debates the use of NI versus FFO. The FFO measure has received increasing research attention (Bhattacharya et al. 2003; Lougee and Marquardt, 2004; Ben-Shahar et al. 2011). Further, a NAREIT (2018) report points out that "FFO has gained wide acceptance by REITs and investors." NAREIT has championed the use of the FFO metric since the 1990s so as to provide a more informative measurement of REITs' operating performance. Earlier studies find evidence that analysts and investors value FFO information (e.g., Ben-Shahar et al., 2011; Fields et al., 1998; Vincent, 1999). Feng et al. (2020) provide evidence that both NI and FFO contain valuable information for investors and that a possible intentional inclusion and/or omission of, "good" vs. "bad" news, respectively, in FFO may occur and that FFO adjustments relate to CEOs' involvement in hiding subpar performance. So, there appears to exist a growing consensus in the recent literature that the FFO metric provides additional valuable information to the NI metric for *firm-level analyses*. To our knowledge, whether FFO does so at an aggregated level (i.e., portfolio- or industry-level) remains an open question. Further, definition of the FFO puts more emphasis on asset management than debt management since management of depreciation expenses is an asset management topic. Hence, we argue that FFO is a more comprehensive measure (relative to NI) in studying REITs' asset management policies.

Counterarguments also exist against the adoption of FFO. The FFO measure is not audited, is voluntarily reported, and is not prepared according to the *Generally Accepted Accounting Principles* (GAAP) (see, Vincent, 1999). Thus, self-selection bias may be present in FFO since managers may engage in cherry-picking of financial items in calculating and reporting FFO and making accounting assumptions in estimating some of the recurring, non-cash revenues and expenses. Measurement errors of these items raise concerns about likely enhancements in the levels of noise in the FFO measure.

Given this discussion,[6] studying whether measuring profitability in terms of FFO, instead of the conventional NI, affects REITs' profitability constitutes another contribution of our paper. Further, we address carefully the selection bias in the data.

[6] Previous research also reports mixed evidence. For example, Graham and Knight (2000) find evidence that FFO has higher incremental information content than NI. Fields et al. (1998) find that, while FFO is better in predicting one-year-ahead FFO and cash flows from operations (CFO), NI is better in predicting contemporaneous stock prices and one-year-ahead NI. Gore and Stott (1998) find that FFO is, in fact, more closely associated with stock returns than NI and that NI predicts dividends better than FFO does. Meanwhile, Ben-Shahar et al. (2011) report counter evidence that FFO explains better REITs' dividend policy than NI. Vincent (1999) reports that all four measures - FFO, earnings-per-share (EPS), CFO, and earnings-before-interest-tax-depreciation-and-amortization (EBITDA) - are associated with stock returns, but their statistical significance depends on the model specifications.

## Portfolio Profitability Metrics and the Bennet Dynamic Decomposition

Applying Bennet's (1920) dynamic decomposition to the annual change of a portfolio's profitability captures four effects (or components): (i) improved profitability of individual REITs (the "within" effect), (ii) shifts of resources from less to more profitable REITs (the "between or reallocation" effect), (iii) entries of more profitable REITs (the "entry" effect), and (iv) exits and conversions of less profitable REITs (the "exit and conversion" effect).[7] The sum of these effects equals the annual change in the portfolio's profitability. We apply separately this decomposition to the annual changes in the sample portfolio's *ROA* and *ROE* and also define each measure by either annual net income (NI) or annual funds from operations (FFO). To our knowledge, bringing the Bennet decomposition effects that make up the temporal change in a profitability measure between (t-1) and (t) is new in the literature.

Since we apply the Bennet dynamic decomposition to a sample portfolio of U.S. Equity REITs, our derivation of the various dynamic decompositions employs the sample portfolio's ROE as an illustration. At time *t*, the ROE ($R_t$) equals net income ($NI_t$) divided by total equity ($E_t$). That is,

$$R_t = \frac{NI_t}{E_t} \tag{2}$$

where $NI_t = \sum_{i=1}^{n_t} NI_{i,t}$, $E_t = \sum_{i=1}^{n_t} E_{i,t}$, and $n_t$ is the number of REITs in the portfolio. After substitution and rearrangement, we get

$$R_t = \sum_{i=1}^{n_t} r_{i,t}\theta_{i,t}, \tag{3}$$

where $r_{i,\,t}$ equals the ratio of net income to equity for REIT *i* in period *t* and $\theta_{i,\,t}$ equals the *i*-th REIT's share of equity in the portfolio. We want to decompose the change in the portfolio ROE into the "within," "between," "entry," and "exit and conversion ('exit' for short from now on)" effects. The change in the portfolio *ROE*, $R_t$, equals the following:

$$\Delta R_t = R_t - R_{t-1} = \sum_{i=1}^{n_t} r_{i,t}\theta_{i,t} - \sum_{i=1}^{n_{t-1}} r_{i,t-1}\theta_{i,t-1.} \tag{4}$$

An appendix provides the details of the derivation that leads to the four components of the Bennet dynamic decomposition:

$$\Delta R_t = \sum_{i=1}^{n_{t/t-1}^{stay}} r_{i,\Delta t}\overline{\theta}_i + \sum_{i=1}^{n_{t/t-1}^{stay}} \left(\overline{r}_i - \overline{R}\right)\theta_{i,\Delta t} + \sum_{i=1}^{n_t^{enter}} \left(r_{i,t} - \overline{R}\right)\theta_{i,t} - \sum_{i=1}^{n_{t-1}^{exit}} \left(r_{i,t-1} - \overline{R}\right)\theta_{i,t-1}. \tag{5}$$

[7] Note that the reverse effect could occur. That is, we could see worsened profitability of individual REITs ("within" effect), shifts of resources from more to less profitable REITs ("between" effect), entries of less profitable REITs ("entry" effect), and exits of more profitable REITs ("exit and conversion" effect) between 1989 and 2015.

where $\overline{\theta}_i = \left(\theta_{i,t} + \theta_{i,t-1}\right)/2$; $\overline{r}_i = \left(r_{i,t} - r_{i,t-1}\right)/2$; $\overline{R} = \left(R_t + R_{t-1}\right)/2$.

The "within" effect equals the summation of each REIT's *Change in ROE* weighted by its average share of the portfolio's total equity between period (t-1) and period (t). The "between (reallocation)" effect equals the summation of the difference between each REIT's ROE and the average portfolio *ROE* between period (t-1) and (t), multiplied by the change in that REIT's share of equity in the portfolio. The "entry" effect equals the summation of the difference between each entering REIT's ROE in period t and the portfolio's average ROE in period t between period (t-1) and period (t) times the entering REIT's share of equity in the portfolio in period (t). Finally, the "exit" effect equals the summation of the difference between each exiting REIT's *ROE* in period (t-1) and the portfolio's average *ROE* between period (t-1) and period (t), multiplied by the exiting REITs' share of equity in the portfolio in period (t-1).

Our approach can offer insights into dynamic changes in the portfolios of financial assets or in industry level analyses, commonly observed in Finance or empirical Microeconomics. It is well-known that research results on returns from portfolio level analyses are more reliable and robust than their equivalents from individual assets or firms obtained from panel data, time series, or cross-sectional explorations. Further, the dynamic decomposition methods split the surviving firms' contributions to the temporal change in a profitability metric into the "within" and "between" effects. The "between" effect sums across all sample REITs simultaneously the (i) difference in a REIT's average profitability between (t-1) and (t) from its industry counterpart and (ii) change in this REIT's market cap from (t-1) to (t). Thus, the "between" effect has a different meaning than investors' active reallocation of assets within actual REIT portfolios.[8] Tracking investors' active portfolio reallocations poses a major data challenge for all researchers.

Exits in this context could be arising from insolvency, mergers and acquisitions or conversions from the public domain to the private domain. All these events are likely to be related to exiting firms' above-average use of leverage. Similarly, firms that enter into an industry are likely to face constraints in accessing the debt markets for a while. Given this background, empirical results, especially on the "within" and "between" Bennet effects of the survivors, should be useful in unearthing more detailed evidence on our research questions. Under the Bennet survivor effects, (i) asset management is likely to dominate debt management since exiting and entering REITs should be more closely affiliated with leverage use and (ii) the FFO measurements are likely to boost asset management's role given that this measure can lessen the influence of debt management.

An appendix shows that some other portfolio or industry performance decomposition methods, for example, Bailey et al. (1992) and Haltiwanger (1997), are special cases of the Bennet (1920) dynamic decomposition and that all of these decomposition methods closely relate to the literature on price indexes, such as the Laspeyres (Laspeyres, 1871) and Paasche (Paasche, 1974) indexes. The dynamic decomposition of such industry performance requires micro-level information on firms

[8] We are grateful to a referee for this insightful point.

- REITs in our paper - within an industry.[9] We can apply the same steps above and as detailed in Appendix 1 to other portfolio performance metrics. To save space, we do not report the year-by-year results for each of the four Bennet decomposition effects for ΔROA and ΔROE for our sample portfolio. These results are available from the authors upon request.

## Data and Sample

We build our database by merging distinct variables with annual frequency available in COMPUSTAT and CRSP/ZIMAN databases and as compiled and kindly provided to us by NAREIT.[10] When a variable does not appear in these sources or contains missing values, data collected from either Internet searches or the EDGAR database enter into our database.

Our sample covers the listed U.S. Equity REITs that report (i) ROA and ROE between −100% to 100% so as to avoid the distortions due to outliers and (ii) FFO between 1989 and 2015. Feng et al.'s (2011) classification of REITs, especially between 1993 and 2015, guides us in identifying the sample firms. Computations of *ROA* and *ROE* use both NI and FFO to elicit evidence on whether the latter offers any incremental information over the former. Data on FFO do not exist for each of the listed sample REIT and are available only between 1989 and 2015. The NI data exist for a larger number of REITs and over a longer period of time. This FFO data limitation defines the selection of our sample and sample period. The average of the yearly ratio of the number of FFO reporting listed REITs to the total number of listed REITs is about 84%. This ratio is greater than 92% after 2006. Despite our efforts to build a comprehensive database, missing data remain an obstacle, reduce somewhat our sample size and sample period, and keep the data at an annual frequency. Panels A and B of Table 1 tabulate the descriptive statistics for our key variables of *NI, FFO, TA, TE, ROE (NI-based) = NI/TE; ROE (FFO-based) = FFO/TE;* and *ROA (NI-based) = NI/TA; ROA (FFO-based) = FFO/TA* by sample year and for the entire sample period. In unreported work, we examine whether there is something different about the REITs for which the information is available.[11] All mean differences in (i) total assets, (ii) total equity, (iii) NI, (iv) ROE, and (v) ROA between the 3855 observations for the full sample and the 3064 observations for the

[9] The availability of micro-level (i.e., establishment-level) data for manufacturing industries spawned a series of such applied microeconomic research. McGuckin (1995) describes the Longitudinal Research Database (LRD) at the U.S. Bureau of the Census upon which this research relies. For banking data at the individual bank level, see the Federal Reserve Bank of Chicago at https://www.chicagofed.org/banking/financial-institution-reports/commercial-bank-data. In sum, aggregate industry data contain important firm- and plant-level dynamics that collectively determine overall industry dynamics.

[10] We thank Brad Case for kindly providing us with data from NAREIT's resources, Erkan Yonder for helping us in identifying and collecting some of our data from various sources, and Steve Cauley for his comments that guided us in cross checking our data vis-a-vis the CRSP/ZIMAN database.

[11] We gratefully acknowledge a referee for this point and will share these mean differences upon request.

**Table 1** Annual means and standard deviations of sample REITs' NI, FFO, total assets, total equity, *ROA* and *ROE*, during the sample period of 1989–2015

Panel A: Net income, funds from operations, total assets and total equity.

| Year | No. of REITs | Net Income ($Million) | | Fund from Operations ($Millions) | | Total Assets ($Million) | | Total Equity ($Million) | |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | Std. Dev. | Mean | Std. Dev. | Mean | Std. Dev. | Mean | Std. Dev. |
| 1989 | 19 | 5.941 | 6.995 | 11.111 | 8.298 | 170.061 | 119.862 | 95.238 | 54.186 |
| 1990 | 20 | 6.007 | 9.125 | 11.505 | 9.664 | 172.204 | 118.104 | 88.859 | 54.629 |
| 1991 | 41 | 4.547 | 8.083 | 9.888 | 11.352 | 152.128 | 142.479 | 88.695 | 75.098 |
| 1992 | 51 | 4.148 | 9.049 | 10.560 | 11.574 | 167.703 | 153.607 | 97.683 | 84.887 |
| 1993 | 90 | 6.818 | 13.031 | 14.845 | 15.075 | 264.702 | 218.855 | 154.763 | 138.041 |
| 1994 | 134 | 10.602 | 12.520 | 20.870 | 19.409 | 336.906 | 325.312 | 172.922 | 163.849 |
| 1995 | 144 | 14.818 | 17.986 | 29.043 | 28.628 | 440.500 | 426.909 | 225.101 | 242.804 |
| 1996 | 137 | 22.678 | 26.737 | 40.546 | 41.294 | 648.893 | 695.515 | 342.402 | 369.735 |
| 1997 | 151 | 30.662 | 32.713 | 57.262 | 62.121 | 1083.200 | 1387.650 | 581.840 | 789.169 |
| 1998 | 152 | 51.410 | 113.290 | 90.571 | 117.005 | 1705.280 | 2398.110 | 800.305 | 1091.160 |
| 1999 | 143 | 59.434 | 73.176 | 106.864 | 125.877 | 1766.710 | 2221.190 | 846.614 | 1105.680 |
| 2000 | 131 | 68.784 | 90.984 | 119.197 | 149.362 | 1909.670 | 2567.950 | 890.482 | 1238.790 |
| 2001 | 124 | 59.181 | 93.838 | 118.744 | 163.664 | 2080.870 | 3109.720 | 954.801 | 1511.010 |
| 2002 | 116 | 68.116 | 117.091 | 129.722 | 194.187 | 2360.960 | 3293.610 | 1037.940 | 1538.740 |
| 2003 | 119 | 77.534 | 134.025 | 129.241 | 191.007 | 2469.210 | 3222.030 | 1069.760 | 1477.690 |
| 2004 | 126 | 75.956 | 112.325 | 129.841 | 181.839 | 2547.450 | 3517.070 | 1071.490 | 1471.220 |
| 2005 | 128 | 85.045 | 145.539 | 130.104 | 190.651 | 2772.930 | 3624.970 | 1102.430 | 1455.210 |
| 2006 | 112 | 122.030 | 195.269 | 173.453 | 243.306 | 3616.790 | 4756.820 | 1368.920 | 1740.310 |
| 2007 | 108 | 135.953 | 224.894 | 202.652 | 285.796 | 3944.430 | 4968.590 | 1396.320 | 1658.270 |
| 2008 | 105 | 86.578 | 169.266 | 184.293 | 264.255 | 4092.660 | 4990.860 | 1455.190 | 1618.570 |
| 2009 | 104 | 29.000 | 134.271 | 146.635 | 241.555 | 3766.180 | 4309.640 | 1568.280 | 1803.780 |
| 2010 | 113 | 19.831 | 228.571 | 152.056 | 279.079 | 3973.670 | 4989.170 | 1708.440 | 2019.380 |
| 2011 | 116 | 71.163 | 190.783 | 200.076 | 317.337 | 4219.220 | 5556.350 | 1858.750 | 2427.400 |
| 2012 | 125 | 90.840 | 215.478 | 229.032 | 359.821 | 4550.880 | 5831.170 | 1994.680 | 2501.970 |

**Table 1** (continued)

Panel A: Net income, funds from operations, total assets and total equity.

| Year | No. of REITs | Net Income ($Million) | | Fund from Operations ($Millions) | | Total Assets ($Million) | | Total Equity ($Million) | |
|---|---|---|---|---|---|---|---|---|---|
| 2013 | 146 | 110.092 | 244.930 | 234.738 | 371.928 | 4550.190 | 5873.750 | 2036.150 | 2585.790 |
| 2014 | 157 | 138.968 | 271.514 | 270.122 | 399.221 | 4942.780 | 6009.190 | 2212.020 | 2715.390 |
| 2015 | 152 | 151.623 | 307.217 | 298.064 | 431.225 | 5279.840 | 6270.770 | 2345.970 | 2900.260 |
| All | 3064 | 66.699 | 164.792 | 134.058 | 246.527 | 2611.870 | 4208.250 | 1131.250 | 1799.040 |

Panel B: NI- and FFO-based ROA and ROE

| | | ***ROA (%)*** – NI-based | | | ***ROA (%)*** – FFO Based | | | ***ROE (%)*** – NI-based | | | ***ROE (%)*** – FFO Based | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | No of REITs | EW-Mean | Std Dev | TATW-Mean | EW-Mean | Std Dev | TATW-Mean | EW-Mean | Std Dev | TEQW-Mean | EW-Mean | Std Dev | TEQW-Mean |
| 1989 | 19 | 3.700 | 4.273 | 3.938 | 7.025 | 4.297 | 6.692 | 5.524 | 6.196 | 6.953 | 11.495 | 6.682 | 11.815 |
| 1990 | 20 | 3.600 | 6.534 | 3.717 | 7.092 | 5.167 | 6.970 | 4.969 | 10.950 | 6.915 | 11.804 | 6.824 | 12.967 |
| 1991 | 41 | 3.448 | 4.802 | 2.789 | 6.927 | 4.650 | 6.709 | 4.341 | 7.431 | 4.468 | 9.998 | 7.349 | 10.751 |
| 1992 | 51 | 2.664 | 5.995 | 2.676 | 6.470 | 4.295 | 6.291 | 2.397 | 10.900 | 4.667 | 9.550 | 5.762 | 10.463 |
| 1993 | 90 | 3.465 | 7.443 | 2.601 | 6.474 | 6.180 | 5.548 | 3.481 | 12.730 | 4.468 | 10.111 | 7.891 | 9.530 |
| 1994 | 134 | 3.719 | 4.916 | 3.196 | 6.622 | 3.409 | 6.217 | 5.549 | 12.510 | 5.983 | 14.542 | 14.535 | 11.648 |
| 1995 | 144 | 3.639 | 3.736 | 3.425 | 7.105 | 3.068 | 6.609 | 6.358 | 10.090 | 6.539 | 15.300 | 15.467 | 12.618 |
| 1996 | 137 | 3.727 | 2.880 | 3.510 | 6.638 | 2.894 | 6.224 | 7.076 | 5.763 | 6.645 | 13.790 | 8.482 | 11.782 |
| 1997 | 151 | 3.309 | 2.598 | 2.851 | 5.652 | 2.467 | 5.303 | 6.280 | 6.300 | 5.296 | 11.668 | 8.016 | 9.851 |
| 1998 | 152 | 2.968 | 2.394 | 3.020 | 5.673 | 2.152 | 5.353 | 5.352 | 10.098 | 6.429 | 14.939 | 19.981 | 11.396 |
| 1999 | 143 | 3.442 | 1.998 | 3.367 | 6.149 | 1.960 | 6.049 | 8.115 | 7.019 | 7.055 | 22.082 | 84.668 | 12.623 |
| 2000 | 131 | 3.594 | 3.377 | 3.602 | 6.142 | 2.566 | 6.242 | 8.664 | 11.968 | 7.724 | 15.694 | 15.493 | 13.386 |
| 2001 | 124 | 2.825 | 3.392 | 2.844 | 5.921 | 3.099 | 5.784 | 5.625 | 10.970 | 6.211 | 17.098 | 32.907 | 12.621 |
| 2002 | 116 | 2.738 | 2.769 | 2.885 | 5.520 | 2.872 | 5.535 | 6.058 | 7.590 | 6.563 | 13.561 | 9.536 | 12.581 |
| 2003 | 119 | 2.687 | 4.059 | 3.187 | 4.938 | 3.732 | 5.338 | 5.223 | 11.472 | 7.373 | 13.999 | 26.412 | 12.344 |
| 2004 | 126 | 3.154 | 4.361 | 2.960 | 4.958 | 3.129 | 5.121 | 7.188 | 10.001 | 7.069 | 11.847 | 14.909 | 12.219 |

**Table 1** (continued)

Panel A: Net income, funds from operations, total assets and total equity.

| Year | No. of REITs | Net Income ($Million) | | Fund from Operations ($Millions) | | Total Assets ($Million) | | | | Total Equity ($Million) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2005 | 128 | 2.900 | 3.305 | 3.081 | 4.686 | 3.206 | 4.703 | 6.890 | 11.027 | 7.746 | 12.881 | 14.505 | 11.825 |
| 2006 | 112 | 3.532 | 3.478 | 3.561 | 5.045 | 2.595 | 4.899 | 8.125 | 8.833 | 9.030 | 11.956 | 21.591 | 12.423 |
| 2007 | 108 | 3.116 | 2.893 | 3.489 | 5.001 | 2.831 | 5.159 | 7.852 | 11.987 | 9.947 | 20.373 | 48.426 | 14.774 |
| 2008 | 105 | 2.209 | 3.210 | 2.079 | 4.614 | 3.183 | 4.507 | 6.016 | 9.797 | 5.886 | 14.004 | 13.031 | 12.760 |
| 2009 | 104 | 1.068 | 4.309 | 0.760 | 3.815 | 4.612 | 3.912 | 2.247 | 14.055 | 1.824 | 8.633 | 16.545 | 9.386 |
| 2010 | 113 | 0.762 | 3.752 | 0.499 | 3.785 | 3.930 | 3.845 | 0.970 | 9.520 | 1.161 | 8.827 | 10.597 | 8.975 |
| 2011 | 116 | 1.188 | 3.828 | 1.691 | 4.478 | 2.673 | 4.746 | 1.966 | 9.659 | 3.842 | 10.431 | 7.697 | 10.786 |
| 2012 | 125 | 1.681 | 2.606 | 2.107 | 4.644 | 2.392 | 5.042 | 3.514 | 7.019 | 4.814 | 11.246 | 8.361 | 11.508 |
| 2013 | 146 | 1.871 | 2.743 | 2.426 | 4.813 | 2.502 | 5.188 | 3.829 | 7.741 | 5.422 | 11.178 | 9.169 | 11.601 |
| 2014 | 157 | 2.054 | 3.662 | 2.913 | 4.724 | 3.163 | 5.482 | 4.428 | 12.123 | 6.537 | 12.352 | 12.794 | 12.309 |
| 2015 | 152 | 2.260 | 2.989 | 2.939 | 5.163 | 2.750 | 5.686 | 5.411 | 10.686 | 6.675 | 14.054 | 17.200 | 12.914 |
| All | 3064 | 2.745 | 3.779 | 2.819 | 5.438 | 3.328 | 5.524 | 5.472 | 10.219 | 6.046 | 13.452 | 25.235 | 11.773 |

We construct our sample mainly from COMPUSTAT data, supplemented by the CRSP/Ziman and EDGAR databases and various internet searches. We restrict each REIT's ROE to fall between −100% to 100% where *ROA* = NI/TA or *ROA* = FFO/TA (*ROE* = NI/TE or *ROE* = FFO/TE) by each sample year. To calculate the Bennet dynamic decomposition between two years, say 1999 and 2000, we need to identify and separate entrants (REITs that entered the industry), exits (REITs that exited the industry or converted to private ownership), and stays (REITs that stayed in the industry). To do so, we matched REIT ID numbers and tickers in our merged database. If a REIT ID number or ticker exists in both 1999 and 2000, then the REIT stays in the industry. If a REIT ID number or ticker exists in 1999, but not in 2000, then the REIT exits. If a REIT ID number or ticker exists in 2000, but not in 1999, then the REIT enters. Panel A reports for the sample of REITs year-by-year summary statistics on NI, FFO, Total Assets and Total Equity. In Panel B, EW, TATW and TEQW indicate equally weighted, total assets weighted, and total equity weighted, respectively. The EW- and TATW-weighted (TEQW-weighted) *ROA* (*ROE*) values follow from eq. 2 and refer to the sample portfolio level *ROA* or *ROE* (e.g., for NI-based portfolio *ROA* in a given sample year = Sum of net income across all sample REITs / Sum of their total assets)

FFO sample are statistically not significant. That is, our FFO sample exhibits the fundamental statistical characteristics of the full sample.

To calculate the dynamic decomposition between two years, say 1999 and 2000, we need to identify and separate entrants (REITs that entered the industry), exits (REITs that exited the industry or converted to private ownership), and stays (REITs that stayed in the industry). To do so, we matched REIT ID numbers and tickers in our merged database. If a REIT ID number or ticker exists in both 1999 and 2000, then the REIT stays in the industry. If a REIT ID number or ticker exists in 1999, but not in 2000, then the REIT exits. If a REIT ID number or ticker exists in 2000, but not in 1999, then the REIT enters. Table 2 provides the number of REITs for each category for the (i) full NAREIT sample in the industry and (ii) our sample of REITs.

Panels A and B of Fig. 1 compare the *ROA* and *ROE* using NI and FFO between 1989 and 2015; Panels A and B of Fig. 2 compare the ΔROA and ΔROE using NI and FFO between 1989 and 2015. Figure 1 data come from Table 1, Panel B; Fig. 2 data come from our own unreported computations. We note that the *NI ROA* and *FFO ROA* as well as the *NI ROE* and *FFO ROE* move together, although the FFO measures are larger than the NI measures. The changes in the two measures of *ROA* and *ROE* look like a much closer match to the levels data. But, in fact, the correlations of the changes are nearly identical (NI-based correlation = 0.74 and the FFO based correlation = 0.87) to the correlations of the levels data (NI-based correlation = 0.75 and the FFO based correlation = 0.86).

Some compromises, arising from data limitations, have not only shaped the construction of the sample portfolio but also defined the sample period. The first restriction originates from the above-mentioned availability of the FFO data. To compare the results across the NI and FFO measures, the sample portfolio follows from the availability of FFO data.

The second restriction has its roots in the lack of data on REITs that exit from the sample at some point during the study period. Finding (reliable) data and information, such as whether they were in fact conversions or bankrupt entities, on several exits has not been possible. Thus, it will be prudent to interpret with caution the reported empirical results on the “exit” effects from the Bennet dynamic decomposition.

The third restriction pertains to the data frequency, which is annual since publicly available data sources do not provide some of the essential variables pertinent to this study at higher frequencies. Studying annual data raises degrees of freedom concerns, pre-empts the pursuit of some of our research questions, and also puts a lid on some of our other research questions. Nonetheless, we still produce a rich set of results and brand-new evidence on U.S. REITs. To the extent that our Equity REIT sample proxies for the *FTSE NAREIT All Equity Index*, our conclusions also relate to this index’s operating profitability.

**Table 2** Evolution of the annual number of sample REITs for the sample period of 1989 to 2015

| | All Publicly Traded REITs: No of REITs in each component | | | Sample REITs: No of REITs in each component | | |
|---|---|---|---|---|---|---|
| Time period | Enter | Stay | Exit | Enter | Stay | Exit |
| 1989–1990 | 1 | 71 | 1 | 1 | 19 | 0 |
| 1990–1991 | 20 | 71 | 1 | 16 | 25 | 0 |
| 1991–1992 | 4 | 88 | 3 | 2 | 49 | 0 |
| 1992–1993 | 55 | 88 | 4 | 36 | 54 | 0 |
| 1993–1994 | 47 | 140 | 3 | 43 | 91 | 0 |
| 1994–1995 | 14 | 180 | 7 | 8 | 136 | 0 |
| 1995–1996 | 8 | 184 | 10 | 6 | 131 | 1 |
| 1996–1997 | 27 | 173 | 19 | 25 | 126 | 0 |
| 1997–1998 | 23 | 183 | 17 | 16 | 136 | 0 |
| 1998–1999 | 7 | 184 | 22 | 4 | 139 | 3 |
| 1999–2000 | 5 | 173 | 18 | 4 | 127 | 2 |
| 2000–2001 | 6 | 165 | 13 | 5 | 119 | 2 |
| 2001–2002 | 7 | 157 | 14 | 5 | 111 | 2 |
| 2002–2003 | 10 | 157 | 7 | 7 | 112 | 0 |
| 2003–2004 | 21 | 153 | 14 | 14 | 112 | 2 |
| 2004–2005 | 13 | 160 | 14 | 11 | 117 | 2 |
| 2005–2006 | 4 | 160 | 13 | 3 | 109 | 0 |
| 2006–2007 | 3 | 145 | 19 | 3 | 105 | 2 |
| 2007–2008 | 2 | 125 | 23 | 0 | 105 | 0 |
| 2008–2009 | 2 | 120 | 7 | 2 | 102 | 3 |
| 2009–2010 | 12 | 122 | 0 | 10 | 103 | 0 |
| 2010–2011 | 9 | 133 | 1 | 9 | 107 | 1 |
| 2011–2012 | 11 | 139 | 3 | 10 | 115 | 1 |
| 2012–2013 | 28 | 148 | 2 | 23 | 123 | 0 |
| 2013–2014 | 18 | 170 | 6 | 14 | 143 | 1 |
| 2014–2015 | 20 | 186 | 2 | 16 | 136 | 0 |

We construct our sample mainly from COMPUSTAT data, supplemented by the CRSP/Ziman and EDGAR databases and various interest searches. We restrict each REIT's *ROA* and *ROE* to fall between −100% to 100%. To calculate the Bennet dynamic decomposition between two years, say 1999 and 2000, we need to identify and separate entrants (REITs that entered the industry), exits (REITs that exited the industry or converted to private ownership), and stays (REITs that stayed in the industry). To do so, we matched REIT ID numbers and tickers in our merged database. If a REIT ID number or ticker exists in both 1999 and 2000, then the REIT stays in the industry. If a REIT ID number or ticker exists in 1999, but not in 2000, then the REIT exits. If a REIT ID number or ticker exists in 2000, but not in 1999, then the REIT enters

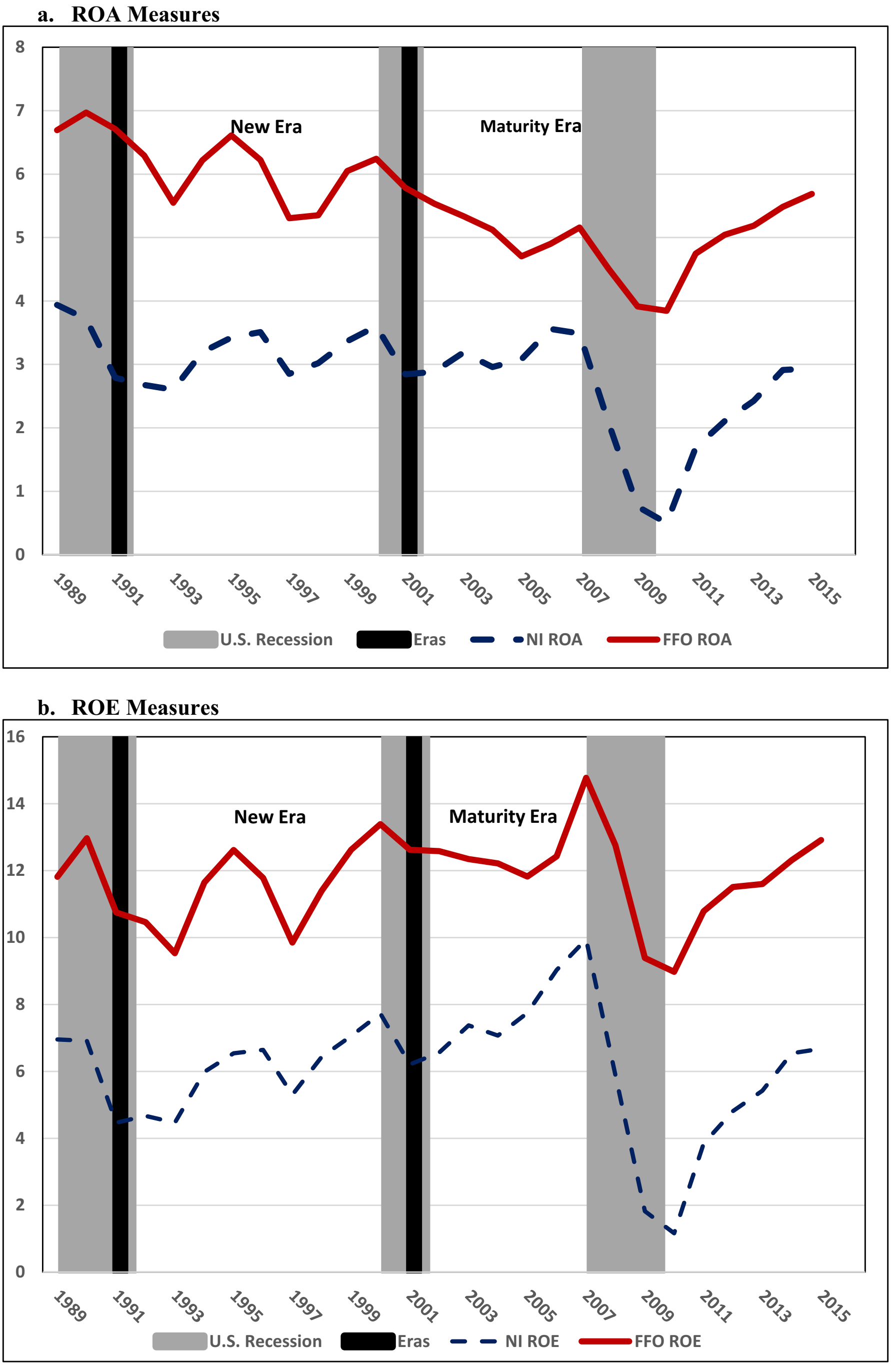


**Fig. 1** NI and FFO Measures of ROE and ROA. **a** ROA Measures. **b** ROE Measures. Source: Our own computations. Results are available from the authors upon request

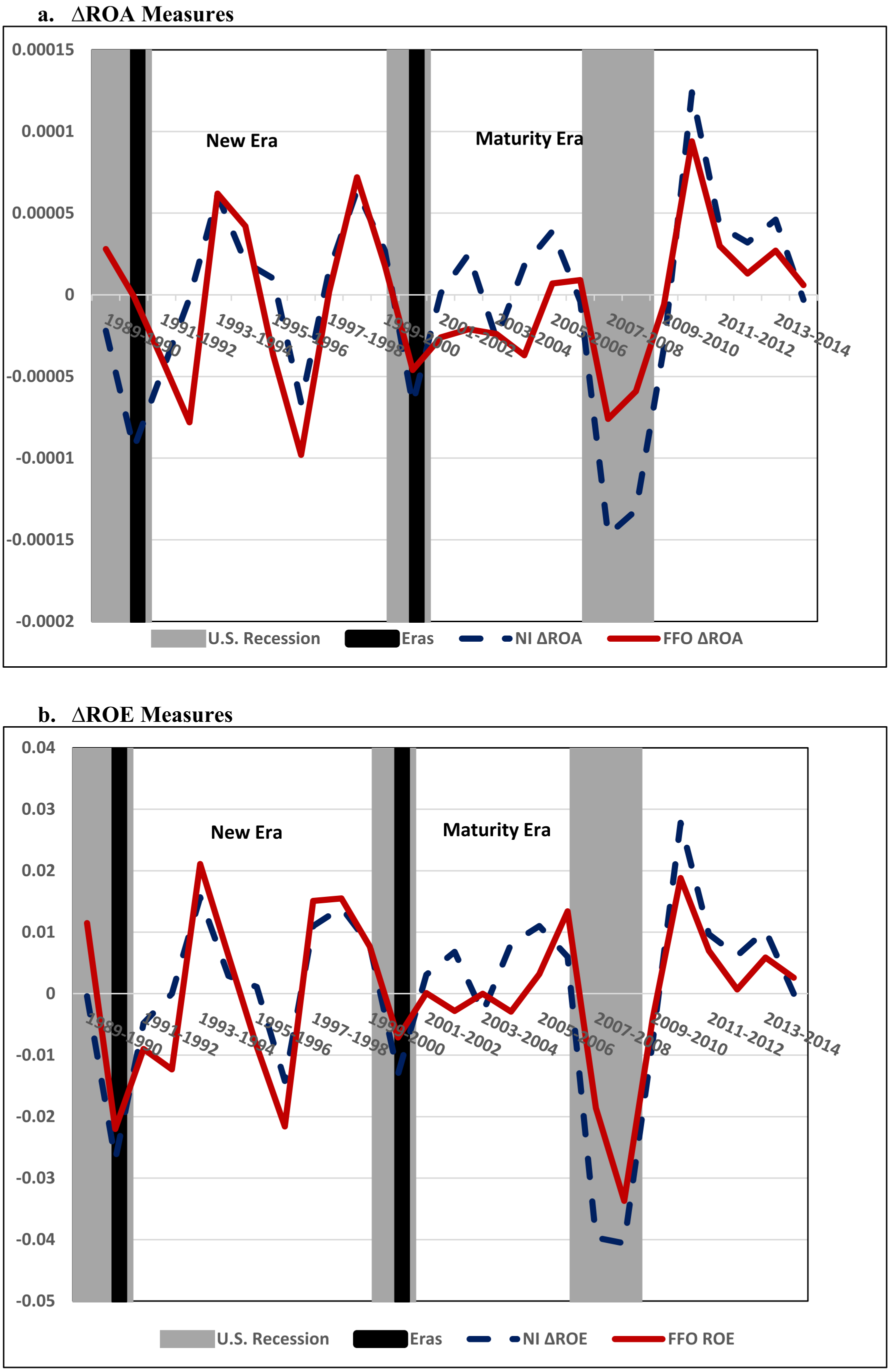


**Fig. 2** NI and FFO Measures of ROE and ROA. **a** ROA Measures. **b** ROE Measures. Source: Our own computations. Results are available from the authors upon request

## OLS Model Specifications and Expected Empirical Relations

This section reports the OLS results obtained from estimating various specifications and offers discussions of these findings. We note, again, that we need to interpret the reported results on the "exit" component with more caution and care than others as lack of data on sample REITs' exits and conversions in some of the study years has been one of the constraining factors in undertaking this study.

### Own-Lag Models and Empirical Implications

We build the following simple estimation models:

$$DV_t = a + b * \left(DV_{(t-1)} \ \ or \ \ DV_{(t-2)}\right) + \varepsilon_t \qquad (6.a)$$

where $DV_t$ is either $ROA_t$, $ROE_t$, $\Delta ROA_{t,(t-1)}$ or $\Delta ROE_{t,(t-1)}$ of our sample portfolio. We run various OLS specifications of Eq. (6.a) under the NI and FFO metrics. Given the persistent temporal patterns of increase in the number of REITs and their market valuations, we can reasonably expect that this persistence can spill over to the profitability measures in Eq. (6.a).[12]

Remember that limitations in the availability of the FFO data for the sample REITs also restrict the sample period to the annual data between 1989 and 2015. The sharing of variables in $\Delta ROA_{t,(t-1)}$ ($\Delta ROE_{t,(t-1)}$) and its first own lag, $\Delta ROA_{(t-1),(t-2)}$ ($\Delta ROE_{(t-1),(t-2)}$), respectively, in Eq. (6.a) could lead to spurious results. In this connection, the second own lags become an alternative variable in estimating Eq. (6.a). The *ΔROA* or *ΔROE* variables constitute flow variables and will be instrumental in extending Eq. (6.a) to the four effects of the Bennet dynamic decomposition, as explained later in the paper.

Holding either NI or FFO constant, portfolio level *ROA* or *ΔROA* mainly measure how well the sample firms manage their assets in their balance sheets. Meanwhile, holding either NI or FFO constant, the difference between portfolio level *ROA* and *ROE* (or between *ΔROA and ΔROE)* measure jointly how well sample firms manage their debts. In the presence of statistically significant coefficient estimates of *b*, examining separately and comparatively the relation between the current and the lagged values across each of these four portfolio-level profitability metrics could reveal whether the observed significance has its roots in the sample firms' asset or debt management policies or both.

Remember that ROE = ROA*(TA/TE) = ROA*Leverage Ratio, where TA and TE mean total assets and total equity at time t. There are three implications of the (TA/TE) ratio for ROA and ROE:

[12] Eq. (6.a) is consistent in spirit with the weak-form market efficiency tests even though our work does not constitute a test of market efficiency. We use sample REITs' operating profits, which are not capable of reflecting immediately all publicly available information, since firms produce them under accounting principles. They are not outcomes of market-transactions. We thank a referee for bringing this matter to our attention.

(i) (TA/TE) >1; if ROA > 0, then ROE > ROA or if ROA < 0 then ROE < ROA;
(ii) (TA/TE) = 1; ROE = ROA irrespective of ROA's sign;
(iii) (TA/TE) < 1; if ROA > 0, then ROE < ROA or if ROA < 0 then ROE > ROA.

The third case is not likely since TA < TE suggests insolvency of a firm.

Given these relations in (i) and (ii), several OLS runs focus on first the ROA-based and then the ROE-based specifications. This approach allows us to study comparatively the signs, magnitudes and statistical significance levels of the coefficient estimates of *b* in Eq. (6.a) for ROA and ROE and also to draw their implications about our research questions.

Finally, holding ROA or ROE constant, examining separately and comparatively the empirical relations under each of the NI and FFO metrics can offer evidence on the differential information content of each. In our context, FFO, through the management of depreciation expenses, helps us demonstrate more comprehensively the effects of asset management on REIT returns. To our knowledge, no evidence currently exists on the differential informativeness between NI and FFO at the level of REIT portfolios and in the context of *ROA*, *ROE*, *ΔROA,* and *ΔROE*. We aim to fill this gap in the literature.

## Results From the Own-Lag Estimations

Results in Table 3 reveal that, irrespective of the use of NI or FFO metric, there is a positive and significant relation between the own-lags and the current values of the dependent variables. The coefficient estimates of *L1-ROA* and *L1-ROE* under the NI and FFO metrics are positive and significant at the 1% level, respectively. Of the four coefficient estimates of the second own lags, only the FFO-based *L2-ROA* is significant at the 1% level and positive. So, evidence of significant influence on *ROA* and *ROE* of the second lags is rather weak.

Do these results suggest that asset management matters more than debt management? We think so. The magnitudes of the coeffient estimates of the own first lag of ROA (0.70 under NI and 0.76 under FFO) are about the same or greater than those of ROE (0.66 under NI and 0.47 under FFO). The t-statistic values of the coeffient estimates of the own first lag of ROA (5.05 under NI and 6.93 under FFO) are also greater than those of ROE (4.22 under NI and 2.53 under FFO).

Do results in Table 3 suggest that FFO may provide differential information in relation to NI at the portfolio level? Once again, we think so. In our view, the FFO is more comprehensive in measuring asset management contributions to REIT returns and offers a stronger control on asset management effects than NI does. While the magnitude and t-statistic values of the FFO-based coefficient estimates of the own first lag of ROA are greater than those of NI-based ROA, the magnitude and t-statistic values of the FFO-based coefficient estimates of the own first lag of ROE are visibly smaller than those of NI-based ROA. Interestingly, the own second lag estimates exhibit (i) a sign reversal from positive, 0.15 under NI, to negative, −0.18 under FFO, for ROE and (ii) magnitude and statistical significance changes from

**Table 3** Own-lags estimation results on *ROA*, *ROE*, *Change in ROA*, and *Change in ROE*

| | ***ROA*** | | ***ROE*** | | ***Change in ROA*** | | ***Change in ROE*** | |
|---|---|---|---|---|---|---|---|---|
| Variable | Esti/t-stat | Esti/t-stat | Esti/t-stat | Esti/t-stat | Esti/t-stat | Esti/t-stat | Esti/t-stat | Esti/t-stat |
| | NI-Based | | | | | | | |
| Intercept | 0.0079 | 0.0192 | 0.0203 | 0.0515 | −0.0002 | −0.0002 | −0.0002 | 0.0005 |
| t-stat | 1.95*** | 3.38* | 2.07** | 3.95* | −0.19 | −0.17 | −0.07 | 0.17 |
| *L1 - ROA or ROE* | 0.7049 | | 0.6596 | | | | | |
| t-stat | 5.05* | | 4.22* | | | | | |
| *L1 - Chg in ROA or ROE* | | | | | 0.3681 | | 0.3355 | |
| t-stat | | | | | 1.90*** | | 1.71*** | |
| L2 - ROA or ROE | | 0.2941 | | 0.1485 | | | | |
| t-stat | | 1.49 | | 0.71 | | | | |
| *L2 - Chg in ROA or ROE* | | | | | | −0.2815 | | −0.2686 |
| t-stat | | | | | | −1.43 | | −1.38 |
| R-Square | 0.53 | 0.09 | 0.44 | 0.02 | 0.14 | 0.08 | 0.11 | 0.08 |
| Adj R-Sq | 0.51 | 0.05 | 0.41 | −0.02 | 0.10 | 0.04 | 0.07 | 0.04 |
| N | 25 | 24 | 25 | 24 | 25 | 24 | 25 | 24 |
| | FFO-Based | | | | | | | |
| Intercept | 0.0125 | 0.0282 | 0.0627 | 0.1387 | −0.0005 | −0.0011 | −0.0009 | −0.0006 |
| t-stat | 2.06** | 3.28* | 2.88** | 5.67* | −0.57 | −1.21 | −0.34 | −0.23 |
| L1 - ROA or ROE | 0.7614 | | 0.4654 | | | | | |
| t-stat | 6.93* | | 2.53* | | | | | |
| L1 - Chg in ROA or ROE | | | | | 0.2295 | | 0.1406 | |
| t-stat | | | | | 1.14 | | 0.69 | |
| L2 - ROA or ROE | | 0.4654 | | −0.1800 | | | | |
| t-stat | | 2.99* | | −0.87 | | | | |

**Table 3** (continued)

| Variable | *ROA* | | *ROE* | | *Change in ROA* | | *Change in ROE* | |
|---|---|---|---|---|---|---|---|---|
| | Esti/t-stat | Esti/t-stat | Esti/t-stat | Esti/t-stat | Esti/t-stat | Esti/t-stat | Esti/t-stat | Esti/t-stat |
| L2 - Chg in ROA or ROE | | | | | | −0.5110 | | −0.4247 |
| t-stat | | | | | | −2.79* | | −2.38** |
| R-Sq | 0.68 | 0.29 | 0.22 | 0.03 | 0.05 | 0.26 | 0.02 | 0.21 |
| Adj R-Sq | 0.66 | 0.26 | 0.18 | −0.01 | 0.01 | 0.23 | −0.02 | 0.17 |
| N | 25 | 24 | 25 | 24 | 25 | 24 | 25 | 24 |

The results in this table follow from the OLS runs of this simple estimation model, $DV_t = a + b*(DV_{(t-1)}\ or\ DV_{(t-2)}) + \varepsilon_t$, where $DV_t$ is either $ROA_t$, $ROE_t$, *Change in* $ROA_{t,(t\text{-}1)}$ *or Change in* $ROE_{t,(t\text{-}1)}$ of our sample portfolio. We run various specifications of this model under the NI and FFO metrics. Any statistically significant estimate of the coefficient *b* helps in disentengaling debt management effects from asset management effects for the sample portfolio of REITs, defined annually over the 1989–2015 period. We use both the FFO and the NI metrics. The FFO metric captures asset management better than the NI metric. The change variables motivate the Bennet (1920) decomposition method and computing the year-by-year magnitudes of the *within effect, between effect, entry effect, and the exit effect.* *, **, and *** indicate statistical significance at 1%, 5% and 10% levels, respectively

0.29 and insignificant under NI to 0.47 and significant at the 1% level under FFO for ROA.

These comparisions further support asset management's more important contributions to REIT returns, as observed earlier. Yet, FFO's control of the contribution of depreciation expenses to asset management does not render the coefficient estimate of the first lag of ROE, 0.47, any less significant. It retains its significance at the 1% level, suggesting that debt management is likely to matter in spite of the lessened importance of financial distress costs and the absence of incremental value from tax shield benefits.

The results on the *ΔROA* and *ΔROE* estimations in Table 3 constitute a prelude for the discussions of the results on the Bennet decomposition effects in the following sections. These results offer some surprises. The NI-based coefficient estimates of the (i) first lags, *L1-ΔROA* and *L1-ΔROE,* are positive and significant at the 10% level and (ii) second lags, *L2-ΔROA* and *L2-ΔROE,* are insignificant and negative. The FFO-based counterparts of the (i) first lag estimates are positive and insignificant and (ii) second lag estimates reverse, are considerably larger in absolute value, and become significant at the 1% and 5% levels.

Do these results lend support to our findings, arising from the ROA and ROE estimations, that debt management matters and that FFO offers differential information?

Both the NI- or FFO-based coefficient estimates of *L1-ΔROA* or *L1-ΔROE* are probably spurious due to the shared $ROA_{(t-1)}$ or $ROE_{(t-1)}$ with the dependent variables (i.e., either *ΔROA* or *ΔROE*). Only the coefficient estimates of FFO-based second-lags, *L2-ΔROA* and *L2-ΔROE,* attain significance (at the 1% and 5% levels) and are negative. So, to be on the side of caution, we interpret only these FFO-based results on *L2-ΔROA* and *L2-ΔROE*. The statistical significance level and the absolute value of the coefficient estimate of *L2-ΔROA* are larger than their *L2-ΔROE* counterparts. Thus, asset management appears to matter more than debt management for the temporal changes in REITs' operating returns. Debt management maintains its likely relevance even for *ΔROA* and *ΔROE*.

The statistical significance changes from those observed for the NI-based estimates to those observed for the FFO-based counterparts support an affirmative answer that FFO contains valuable incremental information relative to NI.

## Lagged Bennet Decomposition Effects and Empirical Implications

We build the following estimation models:

$$DV_t = a + \sum_{i=i}^{4}\left(b_i * BDE_{i,(t-1)}\right) or \sum_{i=i}^{4}\left(b_i * BDE_{i,(t-2)}\right) + \varepsilon_t \qquad (6.b)$$

where $DV_t$ is either $ROA_t$, $ROE_t$, $\Delta ROA_{t,(t-1)}$, or $\Delta ROE_{t,(t-1)}$ and $BDE_{i,(t-1 \text{ or } t-2)}$ are the "within", "between," "entry," and "exit" Bennet decomposition effects. We run various OLS specifications of Eq. (6.b) under the NI and FFO metrics. We infer the influence of either the asset management or the debt management or both from the statistical significances, signs and magnitudes of the coefficient estimates, $b_i$.

Any rise in the Bennet effects causes *ΔROA* and *ΔROE* to increase. If $BDE_{(t-2)}$ rises then both $\Delta ROA_{(t-1)}$ and $\Delta ROE_{(t-1)}$ increase, implying that both $ROA_{(t-1)}$ and $ROE_{(t-1)}$ also increase. These increases squeeze the $\Delta ROA_{(t)}$ and $\Delta ROE_{(t)}$ to lower values. In sum, a rise in $BDE_{(t-1)}$ increases $\Delta ROA_{(t)}$ and $\Delta ROE_{(t)}$ whereas a rise in $BDE_{(t-2)}$ increases $\Delta ROA_{(t-1)}$ and $\Delta ROE_{(t-1)}$ and then lowers the value of $\Delta ROA_{(t)}$ and $\Delta ROE_{(t)}$. Thus, the coefficient on $BDE_{(t-1)}$ is biased toward a positive value while the coefficient on $BDE_{(t-2)}$ is biased toward a negative value.

How can Eq. (6.b) contribute to our research questions? Our supplementary analyses in this section follow directly from two sections earlier and mainly insert the lags of the four Bennet decomposition effects in lieu of the own lags of $DV_t$. So, there are at least two likely contributions of estimating Eq. (6.b). Results in Table 3 reveal statistically significant results, suggesting the dominance of asset management over debt management for REITs. An understanding of whether these results originate from (i) improved profitability of individual REITs (the "within" effect) or (ii) shifts of resources from less to more profitable REITs (the "between or reallocation" effect) or (iii) entries of more profitable REITs (the "entry" effect), or (iv) exits and conversions of less profitable REITs (the "exit" effect) or a combination of these effects should be be useful to the REITs, investors and policymakers. Further, let's suppose that all the results in Table 3 were insignificant. Given that, observing any statistically significant coefficient estimates of the lagged Bennet decomposition effects will be highly informative. Such results can unmask relations that may have been washed out in Eq. (6.a) estimations. Further, how the use of NI or FFO affects these results from the Bennet effects is also immediately useful to judge the information content of FFO vis-a-vis NI.

### The NI-Based Results on the Bennet Decomposition Effects

Panel A (Panel B) of Table 4 tabulates the NI-based results on *ROA* and *ROE* (*ΔROA* and *ΔROE*), respectively. In Panel A, the coefficient estimates of the first lags of the "within" effect, *L1-within*, are positive and significant, at the 1% level, both for *ROA* and *ROE*. The coefficient estimates of the first lags of the remaining three Bennet effects are insignificant. The magnitudes of the *L1-within* coefficient estimates for ROE are slightly larger than their counterparts for ROA. Given these estimation results, the conclusion that both asset management and debt management matter is very reasonable.

In Panel B, while all coefficient estimates of *L1-within* are positive and significant at the 5% level, all coefficient estimates of *L1-entry* are negative and significant *mainly* at the 5% level. *L1-exit* appears to weakly and negatively affect *ΔROE*. The magnitudes of the coefficient estimates of *L1-within* for *ΔROA* are sligthly larger than those for *ΔROE*. These results for surviving REITs strengthen our inferences that asset management matters more than debt management the sample REITs. Further, the absolute value of the coefficient estimates of *L1-entry* for *ΔROE* are larger

**Table 4** The NI-based Bennet effect results on *ROA*, *ROE*, *Change in ROA*, and *Change in ROE*

Panel A: Results on ROA and ROE

| | NI-based ***ROA*** | | | | |
|---|---|---|---|---|---|
| Variable | Estimate/t-stat | Estimate/t-stat | Estimate/t-stat | Estimate/t-stat | Estimate/t-stat |
| Intercept | 0.0272 | 0.0275 | 0.0267 | 0.0273 | 0.0267 |
| t-stat | 20.62* | 17.03* | 13.66* | 16.10* | 14.20* |
| *L1-within* | 0.6774 | | | | 0.7630 |
| t-stat | 3.49* | | | | 3.26* |
| *L1-between* | | −0.8748 | | | 0.8232 |
| t-stat | | −0.79 | | | 0.72 |
| *L1-entry* | | | −0.5802 | | −0.0598 |
| t-stat | | | −0.59 | | −0.06 |
| *L1-exit* | | | | −0.7399 | −1.4615 |
| t-stat | | | | −0.20 | −0.45 |
| R-Sq | 0.35 | 0.03 | 0.01 | 0.00 | 0.37 |
| Adj R-Sq | 0.32 | −0.02 | −0.03 | −0.04 | 0.24 |
| N | 25 | 25 | 25 | 25 | 25 |
| | NI-based ***ROE*** | | | | |
| Intercept | 0.0590 | 0.0605 | 0.0615 | 0.0589 | 0.0596 |
| t-stat | 19.24* | 14.75* | 12.23* | 14.46* | 13.04* |
| L1-within | 0.7508 | | | | 0.7747 |
| t-stat | 3.99* | | | | 3.68* |
| *L1-between* | | −1.0759 | | | 0.5337 |
| t-stat | | −0.68 | | | 0.38 |
| *L1-entry* | | | 0.7818 | | 0.6716 |
| t-stat | | | 0.57 | | 0.58 |

**Table 4** (continued)

| Panel A: Results on ROA and ROE | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | NI-based ***ROA*** | | | | | | | | | |
| *L1-exit* | | | | | | | −4.2077 | | −2.6295 | |
| t-stat | | | | | | | −0.81 | | −0.61 | |
| R-Sq | 0.41 | | 0.02 | | 0.01 | | 0.03 | | 0.44 | |
| Adj R-Sq | 0.38 | | −0.02 | | −0.03 | | −0.01 | | 0.33 | |
| N | 25 | | 25 | | 25 | | 25 | | 25 | |
| Panel B: Results on the ***Change in ROA*** and ***Change in ROE*** | | | | | | | | | | |
| | NI-based ***Change in ROA*** | | | | | | | | | |
| Variable | Estimate/t-stat | Estimate/ t-stat | Estimate/ t-stat | Estimate/ t-stat | Estimate/t-stat | Estimate/t-stat | Estimate/ t-stat | Estimate/t-stat | Estimate/t-stat | Estimate/t-stat |
| Intercept | −0.0005 | 0.0000 | −0.0003 | 0.0000 | −0.0021 | −0.0009 | −0.0008 | −0.0003 | −0.0031 | −0.0018 |
| t-stat | −0.47 | −0.01 | −0.23 | 0 | −1.54 | −0.61 | −0.59 | −0.25 | −2.22** | −1.03 |
| *L1-within* | 0.4023 | | | | | | | | 0.4173 | |
| t-stat | 2.40** | | | | | | | | 2.39** | |
| *L1-between* | | | −0.5391 | | | | | | 1.0487 | |
| t-stat | | | −0.62 | | | | | | 1.23 | |
| *L1-entry* | | | | | −1.56 | | | | −1.642 | |
| t-stat | | | | | −2.22** | | | | −2.35** | |
| *L1-exit* | | | | | | | −2.893 | | −4.279 | |
| t-stat | | | | | | | −1.00 | | −1.76*** | |
| *L2-within* | | −0.1910 | | | | | | | | −0.2748 |
| t-stat | | −1.05 | | | | | | | | −1.34 |
| *L2-between* | | | | −0.0710 | | | | | | −0.0472 |
| t-stat | | | | −0.08 | | | | | | −0.05 |

**Table 4** (continued)

| Panel A: Results on ROA and ROE | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | NI-based ***ROA*** | | | | | | | | | |
| *L2-entry* | | | | | | −0.7770 | | | | −1.2303 |
| t-stat | | | | | | −1.05 | | | | −1.46 |
| *L2-exit* | | | | | | | | −2.2973 | | −2.9115 |
| t-stat | | | | | | | | −0.81 | | −1.02 |
| R-Sq | 0.20 | 0.05 | 0.02 | 0.00 | 0.18 | 0.05 | 0.04 | −0.25 | 0.42 | 0.18 |
| Adj R-Sq | 0.17 | 0.00 | −0.03 | −0.05 | 0.14 | 0.00 | 0.00 | −0.81 | 0.31 | 0.01 |
| N | 25 | 24 | 25 | 24 | 25 | 24 | 25 | 24 | 25 | 24 |
| Panel B: Results on the ***Change in ROA*** and ***Change in ROE*** | | | | | | | | | | |
| | NI-based ***Change in ROE*** | | | | | | | | | |
| Variable | Estimate/t-stat | Estimate/ t-stat | Estimate/ t-stat | Estimate/ t-stat | Estimate/t-stat | Estimate/t-stat | Estimate/ t-stat | Estimate/t-stat | Estimate/t-stat | Estimate/t-stat |
| Intercept | −0.0007 | 0.0009 | 0.0005 | −0.0001 | −0.0048 | −0.0009 | −0.0014 | 0.0003 | −0.0072 | −0.0030 |
| t-stat | −0.25 | 0.28 | 0.15 | −0.02 | −1.22 | −0.21 | −0.42 | 0.1 | −1.77*** | −0.60 |
| *L1-within* | 0.4011 | | | | | | | | 0.3810 | |
| t-stat | 2.15** | | | | | | | | 2.04** | |
| *L1-between* | | | −1.1962 | | | | | | 0.1466 | |
| t-stat | | | −0.91 | | | | | | 0.12 | |
| *L1-entry* | | | | | −1.9610 | | | | −2.2360 | |
| t-stat | | | | | −1.82*** | | | | −2.19** | |
| *L1-exit* | | | | | | | −5.0523 | | −6.1431 | |
| t-stat | | | | | | | −1.18 | | −1.60 | |
| *L2-within* | | −0.2620 | | | | | | | | −0.2501 |
| t-stat | | −1.37 | | | | | | | | −1.18 |

**Table 4** (continued)

Panel A: Results on ROA and ROE

| | NI-based ***ROA*** | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| *L2-between* | | | | 0.9088 | | | | | | 0.6977 |
| t-stat | | | | 0.66 | | | | | | 0.46 |
| *L2-entry* | | | | | | −0.6943 | | | | −1.0673 |
| t-stat | | | | | | −0.63 | | | | −0.9 |
| *L2-exit* | | | | | | | | −2.0120 | | −3.1763 |
| t-stat | | | | | | | | −0.48 | | −0.73 |
| R-Sq | 0.17 | 0.08 | 0.03 | 0.02 | 0.13 | 0.02 | 0.06 | 0.01 | 0.37 | 0.13 |
| Adj R-Sq | 0.13 | 0.04 | −0.01 | −0.03 | 0.09 | −0.03 | 0.02 | −0.03 | 0.24 | −0.05 |
| N | 25 | 24 | 25 | 24 | 25 | 24 | 25 | 24 | 25 | 24 |

The results in this table follow from the OLS runs of this simple estimation model, $DV_t = a + \sum_{i=1}^{4} \left(b_i * BDE_{i,(t-1)}\right)$ *or* $\sum_{i=1}^{4} \left(b_i * BDE_{i,(t-2)}\right) + \varepsilon_t$, where $DV_t$ is either $ROA_t$, $ROE_t$, *Change in* $ROA_{t,(t-1)}$, or *Change in* $ROE_{t,(t-1)}$ and the $BDE_{i,(t-1 \text{ or } t-2)}$ are the *"within", "between," "entry," and "exit,"* effects, as obtained from Bennet (1920), of our sample portfolio. We run various specifications of this model under the net income (NI) and funds from operations (FFO) metrics. Any statistically significant estimate of the coefficient $b_i$ helps in disentengaling debt management effects from asset management effects for the sample portfolio of REITs, defined annually over the 1989–2015 period. For details of the Bennet (1920) dynamic decomposition method, see an appendix. *, **, and *** indicate statistical significance at 1%, 5%, and 10% levels, respectively than their counterparts for *ΔROA*. This is consistent with the views that new entrants into the REIT industry face some difficulties in accessing the credit market and that debt management exerts more influence on new entrants than asset management does.

### The FFO-Based Results on the Bennet Decomposition Effects

Panel A (Panel B) of Table 5 tabulates the FFO-based results on *ROA* and *ROE* (*ΔROA* and *ΔROE*), respectively. In Panel A, the coefficient estimates of *L1-within* are positive and significant at the 1% level (1% and 10% levels) for the ROA (ROE) specifications. The coefficient estimates of the remaining three Bennet decomposition effects do not attain any statistical significance on the *ROA* estimations. While the coefficient estimates of *L1-between* and *L1-exit* are negative and statistically significant, at the 5% level in two different ROE specifications, their significance disappears in the ROE specification with all Bennet effects. The magnitudes of the *L1-within* coefficient estimates for ROA (0.88 and 0.94) are considerably larger than their counterparts for ROE (0.64 and 0.43).

A comparison of the Panel A results in Tables 4 and 5 is in order to study how the use of NI or FFO may affect the results in the ROA and ROE estimations and hence our views. The magnitudes of the coefficient estimates of *L1-within* are visibly larger in the ROA estimations under the FFO measure, 0.88 and 0.94, than under the NI measure, 0.68 and 0.76. All are significant at the 1% level. Interestingly, the magnitudes of the coefficient estimates of *L1-within* are visibly smaller in the ROE estimations under the FFO measure, 0.64 and 0.43, than under the NI measure, 0.75 and 0.77. While three out of the four estimates are significant at the 1% level, the one for 0.43 in the combined model specification under the FFO measure attains significance only at the 10% level.

All these results above suggest that NI is rather uninformative in disentangling the effects of debt management on REITs' operating profitability. FFO, however, opens a door to demonstrate that debt management matters, albeit less than asset management does.

Results in Panel B highlight further the differential information content of FFO. In particular, the coefficient estimates of *L1-within* in the *ΔROE* specifications differ *starkly* from their counterparts in the (i) *ΔROA* specifications, reported in the same panel and (ii) NI-based *ΔROE* specifications in Panel B of Table 4.

In Panel B of Table 5, no coefficient estimate of *L1-within* is significant in the *ΔROE* estimations while they are positive and significant, at the 5% and 10% levels, in the *ΔROA* estimations. While no coefficient estimate of the first lags of the remaining three Bennet decomposition effects attains significance in the *ΔROA* estimations, the coefficient estimate of *L1-between* is negative and significant at the 5% level in one of the *ΔROE* estimations. This significance disappears in the estimation that combines all four Bennet effects. The coefficient estimates of the second lags of three Bennet effects attain significance in the estimation that combines all Bennet effects; they are all negative in the *ΔROA* estimations. *L2-entry* also attains

**Table 5** The FFO-based Bennet effect results on *ROA*, *ROE*, *Change in ROA*, and *Change in ROE*

Panel A: Results on ***ROA*** and ***ROE***

| | FFO-based ***ROA*** | | | | |
|---|---|---|---|---|---|
| Variable | Esti/t-stat | Esti/t-stat | Esti/t-stat | Esti/t-stat | Esti/t-stat |
| Intercept | 0.0536 | 0.0538 | 0.0530 | 0.0546 | 0.0529 |
| t-stat | 42.13* | 35.12* | 30.14* | 34.98* | 32.25* |
| *L1-within* | 0.8848 | | | | 0.9350 |
| t-stat | 3.36* | | | | 3.07* |
| *L1-between* | | −1.3327 | | | 1.2313 |
| t-stat | | −1.24 | | | 0.88 |
| *L1-entry* | | | −1.2030 | | −1.3649 |
| t-stat | | | −1.27 | | −1.22 |
| *L1-exit* | | | | 6.4330 | 3.4657 |
| t-stat | | | | 1.02 | 0.62 |
| R-Sq | 0.33 | 0.06 | 0.07 | 0.04 | 0.39 |
| Adj R-Sq | 0.30 | 0.02 | 0.02 | 0.00 | 0.27 |
| N | 25 | 25 | 25 | 25 | 25 |
| | FFO-based ***ROE*** | | | | |
| Intercept | 0.1158 | 0.1161 | 0.1196 | 0.1178 | 0.1181 |
| t-stat | 54.55* | 45.76* | 35.42* | 47.16* | 40.01* |
| *L1-within* | 0.6354 | | | | 0.4259 |
| t-stat | 4.14* | | | | 1.76*** |
| *L1-between* | | −1.7661 | | | −0.767 |
| t-stat | | −2.34** | | | −0.94 |
| *L1-entry* | | | 1.1174 | | 1.0113 |
| t-stat | | | 1.17 | | 1.21 |

**Table 5** (continued)

| Panel A: Results on ***ROA*** and ***ROE*** | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | FFO-based ***ROA*** | | | | | | | | | |
| *L1-exit* | | | | | | | −7.0656 | | −2.0814 | |
| t-stat | | | | | | | −2.35** | | −0.61 | |
| R-Squ | 0.43 | | 0.19 | | 0.06 | | 0.19 | | 0.48 | |
| Adj R-Sq | 0.40 | | 0.16 | | 0.01 | | 0.16 | | 0.37 | |
| N | 25 | | 25 | | 25 | | 25 | | 25 | |
| Panel B: Results on the ***Change in ROA*** and ***Change in ROE*** | | | | | | | | | | |
| | FFO-based ***Change in ROA*** | | | | | | | | | |
| Variable | Esti/t-stat | Esti/t-stat | Esti/t-stat | Esti/t-stat | Esti/t-stat | Esti/t-stat | Esti/t-stat | Esti/t-stat | Esti/t-stat | Esti/t-stat |
| Intercept | −0.0009 | −0.0006 | −0.0010 | −0.0009 | −0.0016 | −0.0019 | −0.0009 | −0.0011 | −0.0022 | −0.0024 |
| t-stat | −1.04 | −0.57 | −1.02 | −0.89 | −1.45 | −1.22 | −0.88 | −1.14 | −1.93*** | −2.33** |
| *L1-within* | 0.3862 | | | | | | | | 0.4018 | |
| t-stat | 2.09** | | | | | | | | 1.95*** | |
| *L1-between* | | | −0.9157 | | | | | | 0.1981 | |
| t-stat | | | −1.36 | | | | | | 0.21 | |
| *L1-entry* | | | | | −0.9139 | | | | −0.9506 | |
| t-stat | | | | | −1.56 | | | | −1.25 | |
| *L1 -exit* | | | | | | | −3.0093 | | −5.1162 | |
| t-stat | | | | | | | −0.75 | | −1.35 | |
| *L2-within* | | −0.3147 | | | | | | | | −0.3992 |
| t-stat | | −1.58 | | | | | | | | −2.17** |
| *L2-between* | | | | −0.8184 | | | | | | −0.5503 |
| t-stat | | | | −1.12 | | | | | | −0.58 |

**Table 5** (continued)

| Panel A: Results on ***ROA*** and ***ROE*** | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | FFO-based ***ROA*** | | | | | | | | | |
| *L2- entry* | | | | | | −1.78 | | | | −1.2938 |
| t-stat | | | | | | −2.12** | | | | −1.74*** |
| *L2-exit* | | | | | | | | −6.3330 | | −7.1692 |
| t-stat | | | | | | | | −1.61 | | −2.13** |
| R-Sq | 0.16 | 0.10 | 0.07 | 0.05 | 0.10 | 0.17 | 0.02 | 0.11 | 0.29 | 0.46 |
| Adj R-Sq | 0.12 | 0.06 | 0.03 | 0.01 | 0.06 | 0.13 | −0.02 | 0.06 | 0.15 | 0.35 |
| N | 25 | 24 | 25 | 24 | 25 | 24 | 25 | 24 | 25 | 24 |
| Panel B: Results on the ***Change in ROA*** and ***Change in ROE*** | | | | | | | | | | |
| | FFO-based ***Change in ROE*** | | | | | | | | | |
| Variable | Esti/t-stat | Esti/t-stat | Esti/t-stat | Esti/t-stat | Esti/t-stat | Esti/t-stat | Esti/t-stat | Esti/t-stat | Esti/t-stat | Esti/t-stat |
| Intercept | −0.0016 | 0.0006 | −0.0020 | 0.0002 | −0.0016 | −0.0002 | −0.0010 | −0.0006 | −0.0031 | 0.0009 |
| t-stat | −0.57 | 0.26 | −0.78 | 0.08 | −0.45 | −0.06 | −0.35 | −0.24 | −0.83 | 0.24 |
| *L1-within* | 0.2376 | | | | | | | | 0.1846 | |
| t-stat | 1.20 | | | | | | | | 0.61 | |
| *L1-between* | | | −1.5663 | | | | | | −1.3995 | |
| t-stat | | | −2.01** | | | | | | −1.37 | |
| *L1- entry* | | | | | −0.2489 | | | | −0.2347 | |
| t-stat | | | | | −0.25 | | | | −0.22 | |
| *L1-exit* | | | | | | | −0.5743 | | 3.2731 | |
| t-stat | | | | | | | −0.17 | | 0.76 | |

**Table 5** (continued)

| Panel A: Results on ***ROA*** and ***ROE*** | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | FFO-based ***ROA*** | | | | | | | | | |
| *L2-within* | | −0.4556 | | | | | | | | −0.4197 |
| t-stat | | −2.61* | | | | | | | | −1.46 |
| *L2-between* | | | | 1.1094 | | | | | | −0.1106 |
| t-stat | | | | 1.26 | | | | | | −0.1 |
| *L2-entry* | | | | | | −0.0233 | | | | 0.2121 |
| t-stat | | | | | | −0.02 | | | | 0.2 |
| *L2-exit* | | | | | | | | 5.5924 | | 1.4180 |
| t-stat | | | | | | | | 1.85*** | | 0.35 |
| R-Sq | 0.06 | 0.24 | 0.15 | 0.07 | 0.00 | 0.00 | 0.00 | 0.13 | 0.18 | 0.24 |
| Adj R-Sq | 0.02 | 0.20 | 0.11 | 0.02 | −0.04 | −0.05 | −0.04 | 0.10 | 0.01 | 0.09 |
| N | 25 | 24 | 25 | 24 | 25 | 24 | 25 | 24 | 25 | 24 |

The results in this table follow from the OLS runs of this simple estimation model, $DV_t = a + \sum_{i=1}^{4} \left(b_i * BDE_{i,(t-1)}\right)$ *or* $\sum_{i=1}^{4} \left(b_i * BDE_{i,(t-2)}\right) + \varepsilon_t$, where $DV_t$ is either $ROA_t$, $ROE_t$, *Change in* $ROA_{t,(t\text{-}1)}$, or *Change in* $ROE_{t,(t\text{-}1)}$ and the $BDE_{i,(t\text{-}1 \text{ or } t\text{-}2)}$ are the *"within", "between," "entry," and "exit,"* effects, as obtained from Bennet (1920), of our sample portfolio. We run various specifications of this model under the net income (NI) and funds from operations (FFO) metrics. Any statistically significant estimate of the coefficient $b_i$ helps in disentengaling debt management effects from asset management effects for the sample portfolio of REITs, defined annually over the 1989–2015 period. For details of the Bennet (1920) dynamic decomposition method, see an appendix. *, **, and *** indicate statistical significance at 1%, 5%, and 10% levels, respectively significance, at the 5% level, in a univariate *ΔROA* estimation. Meanwhile, (i) no coefficient estimate of the second lags of Bennet effects attain significance in the *ΔROE* estimation that combines all Bennet effects and (ii) *L2-within* and *L2-exit* attain significance at the 1% and 5% levels in univariate model estimations.[13] All these stark differences between the *ΔROA* and *ΔROE* results in Panel B indicate that asset management matters even for the temporal changes in REITs' operating profitability and that debt management either matters in a direction opposite to asset management's or does not matter.

As a final check, a comparison of the Panel B results in Tables 4 and 5 is in order. Overall, the FFO-based results on *ΔROE* differ visibly, considerably and divergently from their NI-based counterparts in Table 4. These differences further solidify our main findings.

## Concluding Comments

Asset and debt management are two essential managerial tasks in any firm and have been a topic of rich academic and policy debates at least ever since MM's (1958) path-breaking result that, under a set of highly restrictive assumptions, including the absence of corporate taxes, and when the no-arbitrage condition is invoked, debt management is not capable of creating any incremental value above and beyond the value created by asset management. In this paper, we study empirically whether debt management matters for the operating profitability of a portfolio of REITs. Two empirical tools help in undertaking this study. First, Bennet's (1920) dynamic decomposition method dissects the temporal changes in the operating profitability of a REIT portfolio into contributions from (i) surviving REITs, (ii) REITs that exit from the industry and (iii) REITs that enter the industry. Second, operating profitability measures are ROA - a measure mostly of asset management - and ROE - an amalgam measure of both asset and debt management. The net income (NI) and the funds from operations (FFO) metrics serve as alternatives in calculating the ROA and ROE measures. FFO, in particular, captures the effect(s) of depreciation and amortization expenses, hence provides more comprehensive information for asset management policies.

We find that asset management is the main driver of value creation for REITs. The Bennet decomposition effects along with the comparative uses of the NI and FFO metrics in estimations reveal that while the effects of debt management on REITs' operating profitability cannot be ruled out, the direction of its effects appears to be mainly opposite to that of asset management. It is our view that our results call for renewed and further investigations into the optimal capital structure question for REITs. We also find that the "within" Bennet effect, indicating improved

[13] A rise in the "within" effect at (t-1) under a positive sign means an increase, for example, in *ΔROE* and, hence, a dominance of *ROE (t)* over *ROE (t-1)* and vice versa. So, a positive "within" effect at (t-1) associates with an increase in *ROE (t)*.

profitability of surviving REITs, leads all remaining Bennet effects and that the FFO appears to contain additional valuable information and is useful even at the portfolio level.

To our knowledge, this paper applies the Bennet (1920) dynamic decomposition approach for the first time in the literature on REITs and possibly even on Real Estate. So, we would like to offer two ideas that may attract attention for future research. First, Xu and Ooi (2018) distinguish "bad" asset growth from "good" asset growth and find, using the Data Envelopment Analysis technique, that 44.5% of REITs' year-on-year asset growth associate with ensuing decreasing returns to scale. (i.e., events are suboptimal). Instead of using temporal change in ROE or ROA, as we do, one may introduce year-on-year asset growth into Xu and Ooi's (2018) work and examine whether the Bennet decomposition effects offer any enriched and refined set of results from a portfolio perspective. Second, obtain first the periodic estimates of the Bennet decomposition effects on the stock returns of a portfolio that covers a typical announcement effect, such as the seasoned equity offerings in Ghosh et al. (2013). A second stage analysis may examine what factors, such as post-issuance operating performance metrics in Ghosh et al. (2013), explain the estimates of each of the Bennet decomposition effects.

## Appendix

### Alternative Dynamic Decompositions[14]

At time $t$, the $ROE$ ($R_t$) equals net income ($NI_t$) divided by total equity ($E_t$). That is,

$$R_t = \frac{NI_t}{E_t} \tag{7}$$

where $NI_t = \sum_{i=1}^{n_t} NI_{i,t}, E_t = \sum_{i=1}^{n_t} E_{i,t}$, and $n_t$ is the number of REITs. After substitution and rearrangement, we get

$$R_t = \sum_{i=1}^{n_t} r_{i,t}\theta_{i,t}, \tag{8}$$

where $r_{i,t}$ equals the ratio of net income to equity for REIT $i$ in period $t$ and $\theta_{i,t}$ equals the $i$-th REIT's share of portfolio/industry equity. We want to decompose the change in portfolio/industry $ROE$ into "within," "between," "entry," and "exit" effects. The change in portfolio/industry $ROE$ equals the following:

$$\Delta R_t = R_t - R_{t-1} = \sum_{i=1}^{n_t} r_{i,t}\theta_{i,t} - \sum_{i=1}^{n_{t-1}} r_{i,t-1}\theta_{i,t-1}. \tag{9}$$

[14] Jeon and Miller (2005) provide details of the derivations. These decomposition methods can be also applied at the industry level that includes all the firms in an industry between (t-1) and (t).

The number of REITs in period (t) equals the number of REITs in period (t-1) plus the number of REIT entrants minus the number of REIT exits.[15] That is,

$$n_t = n_{t-1} + n_t^{enter} - n_{t-1}^{exit}. \tag{10}$$

Rearranging terms in Eq. (10) yields

$$n_t - n_t^{enter} = n_{t-1} - n_{t-1}^{exit} = n_{t/t-1}^{stay};\ or \tag{11}$$

$$n_t = n_{t/t-1}^{stay} + n_t^{enter},\ and\ n_{t-1} = n_{t/t-1}^{stay} + n_{t-1}^{exit} \tag{12}$$

Thus, Eq. (9) adjusts as follows:

$$\Delta R_t = \sum_{i=1}^{n_{t/t-1}^{stay}} r_{i,t}\theta_{i,t} + \sum_{i=1}^{n_t^{enter}} r_{i,t}\theta_{i,t} - \sum_{i=1}^{n_{t/t-1}^{stay}} r_{i,t-1}\theta_{i,t-1} - \sum_{i=1}^{n_{t-1}^{exit}} r_{i,t-1}\theta_{i,t-1}. \tag{13}$$

*Case 1: Existing Dynamic Decomposition - Laspeyres Difference Index.*

While we already separate the "stay" terms from the "entry" and "exit" terms, we now need to decompose the "stay" terms into the "within" and "between" effects. Bailey et al. (1992) and Haltiwanger (1997) weight the "within" effect with the individual firm's portfolio/industry share of equity in the initial year.[16] That is, we need to add and subtract $\sum_{i=1}^{n_{t/t-1}^{stay}} r_{i,t}\theta_{i,t-1}$ from the right-hand side of Eq. (13). After some manipulation, we get

$$\Delta R_t = \sum_{i=1}^{n_{t/t-1}^{stay}} r_{i,t}\theta_{i,\Delta t} + \sum_{i=1}^{n_{t/t-1}^{stay}} r_{i,\Delta t}\theta_{i,t-1} + \sum_{i=1}^{n_t^{enter}} r_{i,t}\theta_{i,t} - \sum_{i=1}^{n_{t-1}^{exit}} r_{i,t-1}\theta_{i,t-1}, \tag{14}$$

where $\theta_{i,\Delta t} = \theta_{i,t} - \theta_{i,t-1}$ and $r_{i,\Delta t} = r_{i,t} - r_{i,t-1}$.

Then, we can rewrite Eq. (14) as follows:

$$\Delta R_t = \sum_{i=1}^{n_{t/t-1}^{stay}} r_{i,\Delta t}\theta_{i,t-1} + \sum_{i=1}^{n_{t/t-1}^{stay}} \left(r_{i,t} - R_{t-1}\right)\theta_{i,\Delta 1} + \sum_{i=1}^{n_t^{enter}} \left(r_{i,t} - R_{t-1}\right)\theta_{i,t} - \sum_{i=1}^{n_{t-1}^{exit}} \left(r_{i,t-1} - R_{t-1}\right)\theta_{i,t-1} \tag{15}$$

where we evaluate the "between," "entry," and "exit" effects relative to the lagged portfolio/industry *ROE* ($R_{t-1}$). For example, the "between" effect sums the differences between each REIT's *ROE* and the portfolio's/industry's *ROE*, multiplied by that REIT's change in equity share. In this case, we evaluate the REIT's *ROE* in period (t) and the industry's ROE in period (t-1).

*Case 2: Alternative Dynamic Decomposition - Paasche Difference Index.*

We decompose the change in industry *ROE* by weighting the "within" effect by period-*t* individual REIT's share of portfolio/industry equity.[17] In other words, we

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[15] Consider two time periods (t-1) and (t). We classify REITs as staying, if a REIT exists in both (t-1) and (t); entering, if a REIT does not exist in (t-1) but does in (t); and exiting, if a REIT exists in (t-1) but not in (t).

[16] Diewert (2005) calls this the Laspeyres (Laspeyres, 1871) difference index.

[17] Diewert (2005) calls this the Paasche (Paasche, 1974) difference index.

need to add and subtract $\sum_{i=1}^{n_{t/t-1}^{stay}} r_{i,t-1}\theta_{i,t}$ to Eq. (13). After necessary manipulations, the final form equals:

$$\Delta R_t = \sum_{i=1}^{n_{t/t-1}^{stay}} r_{i,\Delta t}\theta_{i,t} + \sum_{i=1}^{n_{t/t-1}^{stay}} \left(r_{i,t-1} - R_t\right)\theta_{i,\Delta t} + \sum_{i=1}^{n_t^{enter}} \left(r_{i,t} - R_t\right)\theta_{i,t} - \sum_{i=1}^{n_{t-1}^{exit}} \left(r_{i,t-1} - R_t\right)\theta_{i,t-1}, \tag{16}$$

where we evaluate the "between," "entry," and "exit" effects relative to the current portfolio/industry *ROE* ($R_t$).[18]

*Case 3: Bennet Dynamic Decomposition.*[19]

The Bennet dynamic decomposition computes the arithmetic average of *Case 1* and *Case 2* as follows:

$$\Delta R_t = \sum_{i=1}^{n_{t/t-1}^{stay}} r_{i,\Delta t}\overline{\theta}_{i,t} + \sum_{i=1}^{n_{t/t-1}^{stay}} \left(\overline{r}_i - \overline{R}\right)\theta_{i,\Delta t} + \sum_{i=1}^{n_t^{enter}} \left(r_{i,t} - \overline{R}\right)\theta_{i,t} - \sum_{i=1}^{n_{t-1}^{exit}} \left(r_{i,t-1} - \overline{R}\right)\theta_{i,t-1}. \tag{17}$$

where $\overline{\theta}_i = \left(\theta_{i,t} + \theta_{i,t-1}\right)/2,\ \ \overline{r}_i = \left(r_{i,t} + r_{i,t-1}\right)/2, and\ \overline{R}_i = \left(R_t + R_{t-1}\right)/2.$

The Bennet dynamic decomposition includes four effects. The "within" effect equals the summation of each REIT's change in *ROE* weighted by its average share of portfolio/industry equity between period (t-1) and period (t). The "between (reallocation)" effect equals the summation of the difference between each REIT's *ROE* and the portfolio/industry average ROE between period (t-1) and period (t), multiplied by the change in that REIT's share of portfolio/industry equity. The "entry" effect equals the summation of the difference between each entering REIT's *ROE* in period (t) and the portfolio/industry average *ROE* between period (t-1) and period (t) times the entering REIT's share of portfolio/industry equity in period (t). Finally, the "exit" effect equals the summation of the difference between each exiting REIT's ROE in period (t-1) and the portfolio/industry average *ROE* between period (t-1) and period (t), multiplied by the exiting REIT's share of portfolio/industry equity in period (t-1).

**Acknowledgments** We thank Erkan Yonder, Steve Cauley, the 11th ReCapNet Conference participants for their comments; Brad Case and NAREIT for data; Carolin Schmidt (the editor) for her encouragement; and two reviewers for their excellent and constructive suggestions.

## Declarations

**Conflict of interest** None.

[18] Note, also, that for the between effect, the lagged *ROE* for each REIT replaces the current *ROE* between Eqs. (15) and (16).

[19] Bailey et al. (1992) provide an algebraic decomposition of an industry's total factor productivity (TFP) growth into the "within," "between," and "net-entry" (entry minus exit) effects. Extending Bailey et al. (1992), Haltiwanger (1997) separates the effects of firm entrants into and exit from the industry. Moreover, he also divides the "between" effect into two components – the "share" and "covariance" effects. Stiroh (2000) further decomposes Haltiwanger's (1997) method by dividing firms into those that acquired other firms and those that did not. Finally, the Bennet (1920) dynamic decomposition combines Bailey et al.'s (1992) and Haltiwanger's (1997) dynamic decompositions into a simple average and eliminates Haltiwanger's (1997) "covariance" effect as it emerges because of the method of decomposition. Thus, the weighting of the four effects all employ simple averages of the initial (t-1) and final (t) year weights. See Diewert (2005) for additional details. Jeon and Miller (2005) also provide the derivation.

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