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Local Economy, Asset Location and REIT Firm Growth

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Abstract

This paper empirically examines the extent to which and how local economic growth and asset location affect firm growth based on a sample of US equity real estate investment trusts (REITs) from 2001 to 2016. Using the GDP growth rate by MSA and individual property data of REITs, we construct an aggregated measure of local economic growth for each REIT based on its asset locations in different metropolitan areas. We find that REIT firm growth (measured using both book value and market value of assets) is positively correlated with the lagged firm-level economic growth measure, indicating that REITs allocating assets in areas with higher economic growth tend to experience higher firm growth. Moreover, local economic growth enhances REIT growth mainly through the growth of equity (not through the growth of debt), as REITs with more assets in higher economic growth areas provide higher stock returns to shareholders. These findings suggest that local economic conditions have a significant impact on REIT firm growth and a REIT's asset allocation strategy can play an important role in its long-term prospects.

Keywords Local economy · Asset location · Firm growth · REITs

Introduction

Firm growth is important for economic development and employment (e.g., Moran and Ghoshal 1999; Sterk et al. 2021). Not surprisingly, there is extensive finance and economics literature on what influences firm growth. However, most studies focus on the impact of legal and financial systems (Demirgüç-Kunt and Maksimovic 1998), firm

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leverage (Lang et al. 1996), or technological innovation (Coad and Rao 2008). How a firm's asset locations affect its growth has received limited attention in the literature.

Essentially, commercial real estate assets provide space to house economic activities in a local area (Fanning 2014). When local economic fundamentals are strong, demand for commercial space rises, which may improve local property market conditions and increase property values in the area. Despite the importance of local economic conditions to commercial real estate (CRE), few studies have been done to examine the effects of local economic growth on the growth of real estate firms.[1]

Real Estate Investment Trusts (REITs), which are significant players in the real estate market, hold geographically dispersed assets in different metropolitan statistical areas (MSA) of the US.[2] Since 2001, the REIT sector has experienced dramatic growth in market capitalization and made key contributions to the US Economy.[3] Furthermore, the industry is expected to continue to consolidate, and REITs are likely to face strong future competition, given the potential benefits of economies of scale in real estate operations (Highfield et al. 2019).[4] Thus, due to the growing importance of the sector and the changing market structure, firm growth is a critical issue for REITs. Hence, it is imperative that REIT managers, shareholders and policymakers understand what influences REIT firm growth.

There is recent literature on the impacts of asset location on REIT performance and operations (e.g., Ling et al. 2018, 2019a; Ling et al. 2020). These studies suggest that the geography of a REIT's assets is a critical determinant of its returns and productivity. However, the existing literature does not explicitly consider the impact of asset location on the firm growth of REITs.

In this paper, we examine the extent to which and how local economic growth and asset locations of property portfolios affect REIT firm growth. There are several possible reasons why local economic growth and asset location matter in REIT firm growth. First, strong local economic growth increases demand for commercial space. It is well recognized that local economic dynamics can differ from national dynamics. If a local area experiences strong economic growth, the demand for commercial space increases. Higher demand can lead to higher rent levels and occupancy rates, which increase the asset values of REIT portfolios in the local market. In other words, strong local economic growth provides the potential for asset values of REIT portfolios to grow in the area as the fundamental demand for commercial space is higher.

Second, high economic growth is typically associated with faster urban growth and development of other factors in the local area such as infrastructure and transportation

[1] Several studies in the literature examine the relationship between US residential investment and GDP growth at the aggregate level (e.g., Green 1997; Coulson and Kim 2000). Other papers, largely based on information asymmetry and agency cost theory, examine the impact of external financing on REIT firm growth (e.g., An et al. 2011; Ghosh and Sun 2014) or the role of corporate monitors in discouraging managerial opportunism and empire building (Xu and Ooi 2018).

[2] See REITs' assets across America at http://www.reitsacrossamerica.com/.

[3] Many agree that 2001 is the beginning of the Modern REIT era. In 2016, the equity market capitalization of REITs reached $1 trillion, and a new Real Estate sector under the GICS standard was created by S&P Dow Jones Indices and MSCI Inc. Also, US REITs provided about 2.4 million full-time equivalent (FTE) jobs and generated $148.2 billion of labor income to the economy in 2018 (see www.reit.com).

[4] In addition, see an article on the NAREIT website: https://www.reit.com/news/videos/reit-industry-likely-see-more-consolidation-real-estate-advisor-says. Some industry experts believe that there will be only three to four firms in each property type subsector of REITs in the future.

systems, human capital, technology and regulatory environment. Because of the effects of agglomeration economies, operational efficiency of a REIT's assets in areas with strong economic growth can be higher than that in other areas (e.g., Glaeser et al. 1992; Mitra 1999; Glaeser and Gottlieb 2009). Hence, when a REIT allocates more assets in an area with strong economic growth, it can potentially benefit from agglomeration economies in the area, which facilitates REIT firm growth.

Third, and perhaps more important, recent studies show geographic allocation decisions made by portfolio managers strongly impact the performance of property portfolios. The key argument is as follows. Commercial real estate markets are not quite efficient due to market frictions (e.g., illiquidity and market segmentation). As a result, portfolio managers have an opportunity to observe the effects of economic shocks on local market conditions over time, and they can adjust the portfolio allocations accordingly to achieve higher returns (Ling et al. 2019a). Thus, while portfolio managers face some trading constraints in the illiquid and segmented private property markets,[5] the ability to time property acquisitions and dispositions in different markets based on the expected asset performance can help REIT managers increase the asset values of their portfolios.

Taken together, due to the higher fundamental demand for commercial space, improvements of operational efficiency and productivity of assets resulting from agglomeration economies and the ability to time the market in asset disposition and acquisition decisions, we expect that REITs allocating more assets in areas with higher economic growth should experience higher firm growth.

To conduct the empirical analysis on the effects of local economic growth and asset location on a REIT's firm growth, we employ a sample of equity REITs in the US from 2001 to 2016. The REIT sample provides an ideal setting to examine the effects of local economic growth and asset location on the growth of real estate firms. First, REITs are publicly traded real estate companies, and their properties are located in almost every metropolitan area in the US.[6] The property-level information of REITs is audited and highly reliable. During the sample period, there are 423,417 property-year observations on net book value and location of REIT assets (see Appendix Table 11). Property-level data enables us to accurately measure the geographic exposure of REIT assets and construct an aggregated measure of local economic growth across the different MSAs for each REIT.

Second, REIT growth relies heavily on external capital markets due to the regulatory requirement that REITs have to distribute at least 90% of their taxable income in the form of dividends. As a result, REIT investments are mostly funded by the issuance of debt or seasoned equity offerings, rather than by their internal funds (Ott et al. 2005). This helps us investigate whether the effects of the location factors on REIT firm growth is mainly through the equity or debt growth of REITs.

Third, recent research suggests that REIT managers face certain constraints or mandates for investments that limit their ability to adjust the portfolio allocations for higher returns. For example, Muhlhofer (Mühlhofer 2013) shows that the "dealer rule" reduces the flexibility that REIT managers can pursue higher appreciation returns by

[5] For instance, due to high transaction costs and illiquidity of assets, it is costly for real estate portfolio managers to adjust their portfolio quickly.

[6] In 2019, the total number of REIT-owned properties was 54,606, with a total gross asset value of $1.7 trillion. See http://www.reitsacrossamerica.com/.

making asset disposition decisions. Thus, given these constraints and limitations, REIT managers cannot adjust their asset portfolio exposures consistently, so the impacts of local economic growth on REIT firm growth are likely to be persistent over time. In other words, after REIT managers make their asset allocation decisions, the effects of local economic growth and asset location on asset values are likely to be persistent for a while, as they cannot change the portfolio exposures whenever necessary due to the constraints.

To examine the effects of local economic growth and asset location on REIT firm growth, we construct an aggregated measure of local economic growth for each REIT based on its asset locations in different MSAs. Essentially, this measure is a value-weighted average of the MSA-level GDP growth for each REIT based on the values of its properties located in different MSAs. Net book value of REIT properties is used to calculate the aggregated measure since information on market value or economic value of individual properties of REITs is not available in our database. This firm-level measure (*FirmGDPGrowth*) can capture the cross-sectional differences of local economic growth among REITs based on their asset locations.[7]

In the literature, a firm's growth can be defined as the increase in a firm's size over time (e.g., Penrose and Penrose 2009). Thus, we measure REIT firm growth using the change of the book value and the market value of assets. Both book value and market value of REIT assets are used since the REIT literature suggests market value of real estate assets is typically much larger than the book value. We then estimate a series of panel regressions of REIT firm growth on the lagged firm-level aggregated measure of local economic growth as well as other control variables. Furthermore, to examine how local economic growth and asset location influence REIT firm growth (i.e., the equity or debt growth), we run regressions of the local economic growth measure on the annual changes of total equity and total debt of REITs.

It is worth mentioning that a change in REITs' property values in an MSA is unlikely to cause a significant change in the gross domestic product (GDP) of the area. Based on our data, the property values of REITs are relatively small compared to the total GDP in most of the MSAs. Specifically, the average total property value of a REIT's assets in an MSA accounts for about 1‰ of the area's GDP (see Fig. 1). Hence, we argue that the lagged firm-level measure of the local GDP growth of REITs (the key independent variable in the regressions) is exogenous relative to the growth of total asset values of individual REITs (the dependent variable). If there exists a positive correlation between the two variables, it is reasonable to believe that local economic growth affects REIT firm growth, not the other way around.

Using S&P Global Market Intelligence data on US REITs and Bureau of Economic Analysis (BEA) data on the GDP by MSA, we first conduct a non-parametric analysis on the relation between REIT firm growth and the firm-level local economic growth measure using a quintile method ranked by *FirmGDPGrowth*. As expected, REITs with higher firm-level GDP growth tend to experience higher firm growth. The non-

[7] For example, suppose a REIT holds only two properties that are located in MSA #1 and MSA #2. The values of the two properties are $50 million each, and the GDP growth rates of the two MSAs are 2% and 4%, respectively. Then, the firm-level aggregated measure of local economic growth for this REIT based on its asset locations is calculated as: 0.5*2% + 0.5*4 = 3%. To control for geographic concentration of a REIT's assets, we add a geographic diversification variable in the regression analysis based on the Herfindahl index of the REIT's assets.

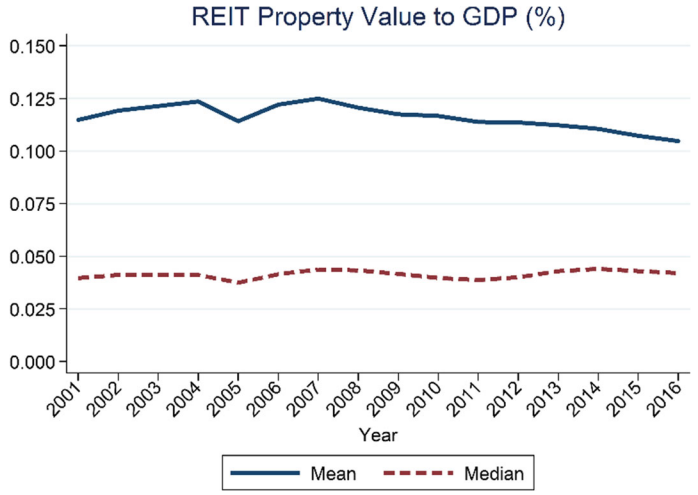

Fig. 1 The Ratio of REIT Property Value to Local GDP at the MSA Level. This figure illustrates the means and medians of the ratio of total net book value of properties that each REIT holds to the corresponding GDP at the MSA-Level in our sample. The sample period is from 2001 to 2016. All variables are defined in Appendix Table 10.

parametric test results show that the means (medians) of total assets' growth of Quintile 5 REITs are significantly higher than those of Quintile 1 REITs.

Next, we examine the extent to which local economic growth and asset location of REIT portfolios affect REIT firm growth using the panel regression. The results show that REITs with more assets in high economic growth areas grow faster in their book value and market value of assets in the cross-section, after controlling for asset geographic concentration measures of REITs as well as other firm characteristics. These results are robust when an instrumental variable (IV) approach is used.

To understand how local economic growth and asset location affect REIT firm growth (i.e., the impact on equity growth or debt growth), we replace the firm growth measures with the equity growth and debt growth of REITs in the regressions. Interestingly, we find that the growth effect of local economic growth and asset location is mainly through equity growth of REITs, not through the debt growth as the literature largely states.

Moreover, we find that the local economic growth measures can explain the cross-sectional variation in stock returns of REITs. The expected returns, abnormal returns, and cumulative returns of REITs with higher *FirmGDPGrowth* are higher than the returns of REITs with more assets in slow economic growth areas, controlling for market risk factors. These findings imply that REITs' asset locations and exposures to regional economies may not be fully priced into their stocks, as firm-level local GDP growth measures are associated with risk-adjusted stock returns. These results are consistent with Smajlbegovic (2019), which shows a firm's stock returns are positively related to its economic activity forecasts of company-relevant regions in the cross-section.

To provide additional robustness checks, we examine whether local GDP growth influences the property value growth of REITs at the MSA level. We estimate a regression of REIT property value growth within an MSA on the MSA-level GDP growth for the top

100, 50, and 20 MSAs ranked by population in the US. We find a strong, positive relationship between these two variables, suggesting that when an MSA experiences higher GDP growth, the total property values of REITs in the MSA tend to be higher.

To the best of our knowledge, this is the first study to examine the effects of local economic growth and asset location on REIT firm growth. We propose a new aggregated measure of local economic growth for each REIT based on its asset locations and asset values. This measure extracts important information from local economic conditions at the MSA level, which typically experience boom or bust in market demand. Our results suggest that local macroeconomic conditions have an important impact on REIT firm growth. REIT portfolio managers should carefully evaluate their asset allocation strategies and consider investing in high economic growth areas, instead of simply expanding their footprints for growth purpose or engaging in empire building.

Our paper complements the growing literature on the role of geographic exposures of property portfolios on CRE performance (e.g., Ling et al. 2018, 2019a; Wang and Zhou 2020). We argue that asset location is not only an important determinant of CRE returns, but also a critical factor for a REIT's long-term growth prospects. This paper has implications for REIT managers and shareholders on their decision-making, especially given that the REIT industry will continue to consolidate and that REITs may face stronger market competition in the future.

This study adds to the firm growth literature. Prior research emphasizes firm-specific characteristics such as firm size, age, and capital structure on firm growth (e.g., Hall 1987; Lang et al. 1996). We focus on the effects of a firm's asset locations and the associated local economic conditions on firm growth. Using property-level information and data on the economic growth of an MSA where these properties are located, we show that a firm's asset spatial pattern and the economic environment where the assets operate play a significant role in firm growth.

Our research also contributes to the existing finance literature that mainly focuses on the effects of the headquarters location (e.g., Kedia and Rajgopal 2009; and Carosi 2016). While a headquarters location is important for both managers and shareholders based on the information-based argument, the locations of a firm's assets are vital. This is particularly relevant for service industries such as hospitality, retail, restaurant, health services, and financial services, where asset or branch location is essential for operations and revenues.

The remainder of this paper is organized as follows. Section 2 describes the data source, key variable constructions, and smarmy statistics. Section 3 illustrates the empirical specifications. Section 4 provides the main empirical findings and some additional analysis. Section 5 concludes with some thoughts on implications and future research.

Sample and Descriptive Statistics

Data Sources

A sample of US equity REITs from 2001 to 2016 is used for the empirical analysis.[8] We collect annual firm-level financial data and other related firm information from the

[8] The sample period starts in 2001 because the GDP data by metropolitan area from BEA are available since 2001.

S&P Global Market Intelligence (formerly known as SNL) database. For every REIT, we include the following variables: total assets, accumulated depreciation, total capitalization, total equity, total debt, funds from operations, net operating income, real estate depreciation and amortization, credit line drawn to available, cash, share price, dividend, common share outstanding, occupancy rate, real estate property type,[9] and the year initial public offering (IPO) or REIT status established.[10] Property-level data are also collected from the S&P Global. For each REIT's property, we collect its net book value, location, and real estate property type. The net book value is commonly used to calculate the geographic concentration of REIT assets, as in Hartzell et al. (2014), Ling et al. (2018), and Beracha et al. (2019a, b). The summary statistics of the property level information can be found in Appendix Table 11.

Furthermore, institutional ownership data are from the 13F database by Thomson Reuters, and the market risk factors as well as risk-free rate data are from Kenneth French's website.[11] The annual GDP growth data by metropolitan area are from the BEA.[12]

Firm-Specific Local Economic Growth Measure

Similar to the value-weighted average return of a stock portfolio, we construct a firm-level local economic growth measure for each REIT each year. Specifically, we first sum up the net book values of a REIT's properties by MSA in each year.[13] Then, the ratio of a REIT's total property value in each MSA to its total property value is calculated for each year.[14] This ratio is the value-weight, W, which is used to construct the firm-specific local economic growth measure. Next, we identify the annual GDP growth rate for each MSA each year as G. Thus, the firm-level aggregated measure of local economic growth for a REIT (*FirmGDPGrowth*) is calculated as its property-value-weighted average of GDP growth rate by MSA. More formally, the measure is defined as:

$$FirmGDPGrowth_{i,t} = \sum_{i=1}^{N} W_{i,c,t} * G_{i,c,t} \quad (1)$$

[9] The real estate property types are casino, health care, hotel, industrial, manufactured home, multifamily, office, other retail, regional mall, self-storage, shopping center, specialty, and diversified, based on the classification provided by the S&P Global Market Intelligence database.

[10] When accounting information is not available at year t but available at year t-1 and $t + 1$, the value for the variable at year t is replaced by the average of the values at year t-1 and year $t + 1$.

[11] Kenneth R. French's Data Library: http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html.

[12] See more details from https://www.bea.gov/data/gdp/gdp-metropolitan-area.

[13] Net book value is used to construct the firm GDP growth measure since the database (SNL) does not provide market or economic value of REIT properties. In addition, following Ling et al. (2021), we use the adjusted cost of REIT properties to construct the *FirmGDPGrowth* variable. The results are similar to those based on net book value.

[14] A very small number of REIT properties are located in rural areas, which are not part of an MSA. To make the total weight equal to 100%, we drop these properties in the sample. For robustness, we conduct the analysis without dropping those properties. The results are qualitatively similar, which are not reported in the paper for brevity.

where W represents the fraction of a REIT's property value in MSA c to a REIT's total property value, G represents the GDP growth in each MSA, i represents a firm, c represents an MSA, and t represents a year.

Figure 1 plots the means and medians for the ratio of REIT total property value over the GDP in the corresponding MSAs. Specifically, the total value of properties held by a REIT in an MSA on average accounts for 0.105% to 0.125% of the GDP in the area during the 2001–2016 sample period, while the mediums of the ratio range from 0.035% to 0.05%.[15]

In the literature, local economic growth is generally influenced by factors such as technology (Fagerberg 1994), productivity growth (Bullard 2016), natural resources (Sachs and Warner 2001), human resources (Teixeira and Queirós 2016), and capital allocation (Beck and Levine 2002), but usually not by a single firm. Given the average ratio of REIT property value to the MSA GDP is very small (about 0.1%), we argue that the changes in local economic growth at the MSA-level are exogenous to firm asset growth rates of individual REITs. In other words, the share of the total property value of REITs is negligible compared to the size of the economy of an MSA. Thus, the relationship between local economic growth and firm growth should be straightforward. A reverse causality issue, i.e., asset growth of a REIT significantly changes the GDP of a metropolitan area, should not be a concern for the empirical analysis.

Firm Growth Measure

In the literature, a firm's growth can be defined as the increase in a firm's asset size over time (Penrose and Penrose 2009). Thus, we measure REIT firm growth in year t using the change of the book value as well as the market value of REIT assets from year t-1 to year t. The first firm growth measure is the log difference of the book value of assets. Considering the depreciation and amortization of real estate assets are non-cash charges that reduce earnings but not the actual cash flows, we adopt the second firm growth measure as the log difference of gross total assets, which equals total assets plus accumulated depreciation.

Since the market value of real estate assets is typically greater than the book value for commercial properties (e.g., Feng et al. 2019), another measure for firm growth is adopted as the log difference of total capitalization. This measure includes implied market value of equity, book value of debt, total preferred equity, preferred interest in operating partnership units, other mezzanine level items, and non-controlling interest. The fourth firm growth measure is the log difference of the current market value, which is calculated as the net operating income divided by the market-derived capitalization rate reported by the SNL database.[16] Moreover, we split the book value of assets into total equity and total debt, and compute the growth of equity and debt as the log difference of total equity and total debt, respectively.

[15] The average value of total assets of REITs, consisting of properties in different areas, is about $3.5 billion.
[16] Since our research focus is on the impact of local economic growth and asset location on overall firm growth of REITs, we use both book value and market value of REIT total assets. This is different from Ling, Ooi, and Xu (2019), which examines the impact of asset growth rate on the future stock performance. In their paper, the asset growth rate (ASSETG) is based on the book value of total assets.

Expected Return and Abnormal Return of Stocks

To measure the effect of local economic growth and asset location on REIT stock returns, we first estimate the annual expected return for every REIT using Fama-French (1993) three-factor model, Carhart (1997) four-factor model, and Fama-French (2015) five-factor model. Specifically, we run the following regressions during the sample period.

$$\begin{aligned} R_{i,t} &= \alpha_0 + \alpha_1 R_{m,t} + \alpha_2 SMB_t + \alpha_3 HML_t + \varepsilon_t \\ R_{i,t} &= \gamma_0 + \gamma_1 R_{m,t} + \gamma_2 SMB_t + \gamma_3 HML_t + \gamma_4 MOM_t + \varepsilon_t \\ R_{i,t} &= \beta_0 + \beta_1 R_{m,t} + \beta_2 SMB_t + \beta_3 HML_t + \beta_4 RMW_t + \beta_5 CMA_t + \varepsilon_t \end{aligned} \tag{2}$$

where $R_{i,t}$ is the excess stock return of REIT i, $R_{m,t}$ is the risk-free stock return of the market, SMB_t (Small minus Big), HML_t (High minus Low), MOM_t (Momentum), RMW_t (Robust minus Weak), and CMA_t (Conservative minus Aggressive) are the return to zero investment factor-mimicking portfolios designed to capture size, book-to-market effects, momentum, profitability, and investment risk at year t, respectively.

Then, we use the market return, the annual *SMB*, *HML*, *MOM*, *RMW*, and *CMA* risk factors, and the estimated factor loadings, a_s, γ_s, and β_s, of the factor models [see Eq. (2)] to obtain the estimated expected return, $\widehat{R}_{i,t}$.

We also calculate the annual abnormal return using the realized return minus the estimated expected return. More formally, the abnormal return is defined as:

$$\begin{aligned} AR_{i,t} &= \left(R_{i,t} - R_{f,t}\right) - \left(\alpha_0 + \alpha_1 R_{m,t} + \alpha_2 SMB_t + \alpha_3 HML_t\right) \\ AR_{i,t} &= \left(R_{i,t} - R_{f,t}\right) - \left(\gamma_0 + \gamma_1 R_{m,t} + \gamma_2 SMB_t + \gamma_3 HML_t + \gamma_4 MOM_t\right) \\ AR_{i,t} &= \left(R_{i,t} - R_{f,t}\right) - \left(\beta_0 + \beta_1 R_{m,t} + \beta_2 SMB_t + \beta_3 HML_t + \beta_4 RMW_t + \beta_5 CMA_t\right) \end{aligned} \tag{3}$$

where $AR_{i,t}$ is the abnormal stock return of REIT i at year t and the other variables are as previously defined.

Control Variables

Following the literature, we include a number of control variables in the regressions. First, several basic firm characteristic variables used in the finance literature are added. They are: firm size, defined as the natural logarithm of total assets; firm age, the natural logarithm of one plus firms' years since IPO;[17] firm leverage ratio (*Leverage*), the ratio of total assets to total equity; market-to-book equity ratio (*Market-to-Book*), the ratio of the market capitalization of the REIT to its total equity; and institutional ownership percentage, the percentage of shares that are owned by institutions.

Moreover, we include a few commonly used controls in the REIT literature. Since most REITs are liquidity constrained due to the 90% dividend rule, we add several financial liquidity measures: cash stock, defined as cash and cash equivalents scaled by total assets; cash flow, net operating income, and real estate depreciation and

[17] In case the IPO date is not available, we calculate the firm age based on the year in which the REIT status is established.

amortization scaled by total assets; credit line drawn/available, revolving credit lines drawn down as a percent of revolving credit lines available, as reported by SNL. We also add return on assets, defined as funds from operations divided by total assets.

In addition, the existing REIT literature suggests that location of properties in the Gateway cities (Boston, Chicago, Los Angeles, New York, San Francisco, and Washington, D.C.) matters in REIT performance and investment decisions (Ling et al. 2018). Thus, we create a variable, Gateway Cities Concentration, which is calculated as the ratio of a REIT's assets invested in the six Gateway MSAs to its total assets.

Finally, one may argue that property portfolios of some REITs are more geography and property type diversified, while other REITs are more concentrated. This may influence the effect of local economic growth on REIT firm growth. Thus, we add two more control variables: a geographic diversification variable, defined as the negative of the Herfindahl Index of a REIT's assets invested in different MSAs, and a property-type diversification variable, defined as the negative of the Herfindahl Index of a REIT's assets invested in different property types. The definitions for the variables mentioned above are listed in Appendix Table 10.

Summary Statistics

We exclude firm-year observations without the firm-level local economic growth measure and total assets. Numeric variables are winsorized at the 1% and 99% tails of the distributions to avoid the influence of extreme observations. The final sample consists of 2174 firm-year observations from 2001 to 2016. The summary statistics for firm growth measures, *FirmGDPGrowth* measure, and firm characteristics used in the empirical analysis are reported in Table 1.

Specifically, the mean and median of *FirmGDPGrowth*, the main variable of interest, are 3.98% and 4.07%. For the firm growth measures, the average (median) total assets growth, gross total assets growth, total capitalization growth, and current market value growth are 11.3% (5.6%), 12% (6.7%), 12.2% (11.2%), and 14.4% (12%), respectively. The total asset growth measures are similar to the firm growth rates in Ling et al. (2019b). The mean and median equity (debt) growth rate are 12.9% (6.3%) and 12.1% (5.1%). In terms of stock performance, a typical firm has an average realized return of 13.5%, an average expected return from the Fama-French (1993), Carhart (1997) and Fama-French (2015) models of 12.3%, and an average abnormal return from those three models of 0%.

Figure 2 illustrates the evolution and distribution of the *FirmGDPGrowth* variable from 2001 to 2016. Panel A plots the mean, median, one standard deviation below the mean (Low) and above the mean (High). The figure is largely consistent with the business circle during the period. The local GDP growth of REITs increased from 2001 to 2004, and then started decreasing and hit the bottom in 2008. It bounced back from the financial crisis and slowly increased from 2009 to 2016. In Panel B, the distribution of the local GDP growth variable is symmetric while slightly left-skewed. Each bar represents a 1% change in GDP. One standard deviation below the mean (3.98%) local GDP growth is 1.82% and that above the mean is 6.13%, as shown by the blue lines.

Table 1 Summary Statistics

	Mean	Median	Std. Dev.	Min	Max	Obs.
Total Assets ($B)	3.521	2.061	4.594	0.041	25.282	2274
Year Listed	14.848	11.000	12.830	0.000	54.000	2247
Leverage	1.569	1.208	2.144	−8.691	13.352	2274
Return on Assets	0.054	0.054	0.034	−0.076	0.151	1971
Cash Stock (%)	2.910	1.334	4.581	0.023	29.536	2006
Cash Flow (%)	13.023	12.649	3.676	4.159	26.207	2003
Credit Line Drawn / Available (%)	31.082	25.817	27.995	0.000	100.000	2088
Market-to-Book Equity Ratio	1.834	1.527	1.538	−3.478	10.213	2109
Geographic Diversification	−0.392	−0.278	0.273	−1.000	−0.138	2274
Property Type Diversification	−0.813	−0.957	0.237	−1.000	−0.251	2274
Gateway Cities Concentration	0.249	0.145	0.269	0.000	1.000	2274
Institutional Ownership	0.749	0.838	0.274	0.008	0.990	2274
Total Assets Growth	0.113	0.056	0.223	−0.278	1.087	1999
Gross Total Assets Growth	0.120	0.067	0.209	−0.253	1.030	1994
Total Capitalization Growth	0.122	0.112	0.211	−0.404	0.816	1844
Current Market Value Growth	0.144	0.120	0.278	−0.495	1.483	1829
Equity Growth	0.121	0.051	0.279	−0.433	1.437	1959
Debt Growth	0.129	0.063	0.314	−0.534	1.576	1984
Realized Return	0.135	0.137	0.277	−0.689	1.012	1845
Expected Return – 3 Factor Model	0.123	0.132	0.210	−0.857	1.002	1821
Expected Return – 4 Factor Model	0.123	0.129	0.222	−0.846	1.080	1821
Expected Return – 5 Factor Model	0.123	0.135	0.225	−0.864	1.002	1821
Abnormal Return – 3 Factor Model	0.000	0.000	0.183	−0.969	0.874	1821
Abnormal Return – 4 Factor Model	0.000	0.000	0.168	−0.888	0.800	1821
Abnormal Return – 5 Factor Model	0.000	0.000	0.163	−0.885	0.875	1821
FirmGDPGrowth (%)	3.980	4.065	2.154	−3.360	8.579	2274

This table reports the summary statistics of key variables used in the analysis of this paper. The sample period is 2000–2016. Variables have been winsorized at the 1% and 99% tails of the distributions to avoid the influence of extreme observations. All variables are defined in Appendix Table 10

Empirical Methods and Specification

To investigate the effects of the local economic growth on firm growth, we start with a univariate analysis on the association between the growth of book value and market value of a firm's assets and local economic growth. To do so, we create five portfolios sorted by the *FirmGDPGrowth* of REITs and examine the mean and median of the growth of book value and the market value of assets in these portfolios (i.e., total assets growth, gross total assets growth, total capitalization growth, and current market value growth, respectively).

Next, we regress the firm growth of REITs on their local GDP growth measure in the previous year while controlling for other firm characteristics as follows[18]:

[18] We use a widely used approach for panel regressions in corporate finance, in which the robust t-statistics are corrected for clustering of residuals at the firm level, while controlling the time-series variation by adding year fixed effects (e.g., see Petersen 2009; Coles et al. 2014). An anonymous referee suggests us to use Fama-Macbeth two-stage model to control for the time-series variation in GDP growth and highlight the effect of asset allocation on REIT firm growth. We follow the suggestion and estimate Equation (4) using the Fama-MacBeth model. The results are largely consistent, suggesting that spatial allocation of assets is an important factor influencing firm growth. We appreciate an anonymous the referee for this valuable suggestion.

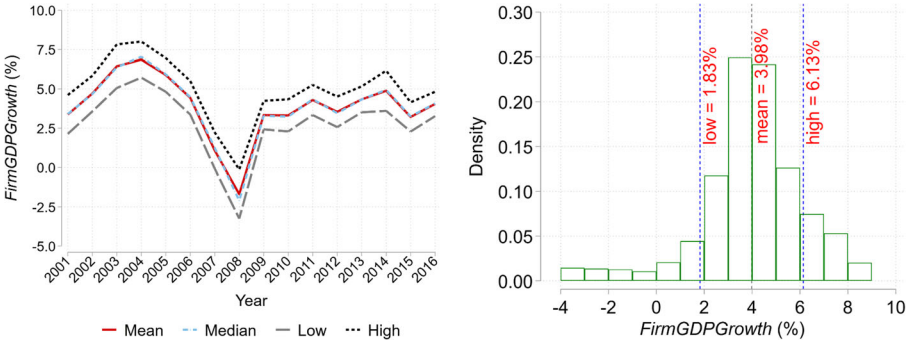

Fig. 2 Evolution and Distribution of the Firm-Level Local GDP Growth. This figure illustrates the evolution and distributions of the firm-level GDP growth variable (*FirmGDPGrowth*) of REITs in the sample. The sample period is from 2001 to 2016. All variables are defined in Appendix Table 10.

$$FirmGrowth_{i,t} = \beta_0 + \beta_1 FirmGDPGrowth_{i,t-1} + \gamma Control_{i,t-1} + \eta_i + \alpha_t + \varepsilon_{i,t} (4)$$

where $FirmGrowth_{i,t}$ is either the growth of book value of assets (total assets growth and gross total assets growth) or market value of assets (total capitalization growth and current market value growth) of REIT i at year t, and $FirmGDPGrowth_{i,t-1}$ is the value-weighted average GDP growth rate of REIT i at year *t-1*. The control variables in the regression include firm size, firm age, firm leverage ratio, return on assets, cash stock, cash flow, credit line drawn/available, market to book equity ratio, geographical and property type diversification, gateway cities concentration, and institutional ownership percentage. η_i represents real estate property type fixed effects, α_t represents year fixed effects, and $\varepsilon_{i,t}$ is the error term. The variables included in Eq. (4) are as defined earlier in the text and Appendix Table 10.

Following the literature (e.g., Ling et al. 2021), the independent variables (including the key variable, *FirmGDPGrowth*) in the panel regression are calculated at the end of year *t-1* (i.e., using the information at the end of the previous year). As the business model for REITs is to own and operate income-producing real estate assets, the use of the lagged explanatory variables can capture the effects of local GDP growth on REIT firm growth.

A firm's assets are equal to the sum of its equity and debt. To examine how local GDP growth influences REIT firm growth (equity growth or debt growth), we replace the dependent variables in Eq. (4) with the two components of REIT asset value to assess the effect of local GDP growth on the growth of equity and the growth of debt, respectively.

To examine the relationship between the local economic growth measure (*FirmGDPGrowth*) and the cross-sectional stock returns of REITs, we regress the estimated expected returns of REITs, $\widehat{R}_{i,t}$, and the annual abnormal returns, $AR_{i,t}$, on their firm-specific local economic growth measure as follows:

$$StockReturn_{i,t} = \beta_0 + \beta_1 FirmGDPGrowth_{i,t} + \varepsilon_{i,t} \quad (5)$$

where the dependent variable is either the expected returns, $\widehat{R}_{i,t}$, and the annual abnormal returns, $AR_{i,t}$, of REIT i at year t. $\varepsilon_{i,t}$ is the error term.

Empirical Results

The Growth of REIT Firm Assets

We first conduct a non-parametric analysis on the relation between REIT firm growth and the aggregated measure of local economic growth of REITs within each of these measurements' quintile ranking. Table 2 presents the results from a quintile analysis that compares the mean and median total assets growth, gross total assets growth, total capitalization growth, and current market value growth of REITs sorted by *FirmGDPGrowth*. The results show that the spreads of the mean (median) of total assets growth, gross total assets growth, total capitalization growth, and current market value growth between the two extreme quintiles (the 5–1 spread) are 0.030 (0.026), 0.026 (0.026), 0.052 (0.059), and 0.042 (0.049), respectively. Each of these differences is statistically significant from the two-sample *t*-test or the two-sample Wilcoxon rank-sum test.

Next, the baseline results based on Eq. (4) are reported in Table 3. We find that REITs with more assets in high economic growth areas have, on average, higher firm growth, controlling for basic firm characteristics, financial performance, financial liquidity, and geographic and property type diversification. Specifically, Columns (1) and (2) show that the estimated coefficients of the lagged *FirmGDPGrowth* are both 0.009, statistical significance at the 1% level, based on either property type fixed effect or firm fixed effect. These results suggest that REITs with more properties located in higher economic growth areas tend to have higher growth in their total asset values. When the dependent variable is gross total assets growth, the estimated coefficients are also positive [0.009 in a property type and year FE model (Column 3) and 0.008 in a firm and year FE model (Column 4)]. Overall, the results indicate that a REIT's asset growth is positively related to the local economic growth in the areas its assets are located.

In addition to the main coefficients of interest, the results show that REITs with larger size and older age tend to experience less growth. However, firms with higher

Table 2 Firm Growth of Portfolios Sorted on Local Economic Growth

Portfolio		1	2	3	4	5	5–1 Spread	*t*-test	rank-sum test
Total Assets Growth	Mean	0.091	0.117	0.120	0.114	0.121	0.030	1.967	
	Median	0.043	0.071	0.056	0.044	0.069	0.026		3.492
Gross Total Assets Growth	Mean	0.100	0.123	0.125	0.122	0.127	0.027	1.910	
	Median	0.055	0.078	0.066	0.056	0.081	0.026		3.498
Total Capitalization Growth	Mean	0.092	0.132	0.115	0.128	0.144	0.052	3.233	
	Median	0.078	0.118	0.114	0.112	0.137	0.059		4.111
Current Market Value Growth	Mean	0.118	0.169	0.136	0.137	0.160	0.042	1.960	
	Median	0.087	0.127	0.134	0.118	0.136	0.049		3.011

This table shows the mean and median of firm growth across portfolios sorted for the *FirmGDPGrowth* measure. *t-statistics* from the two-sample *t*-test and the *z*-statistics from the two-sample Wilcoxon rank-sum test are reported. All variables are defined in Appendix Table 10

Table 3 The Growth of Book Value of Assets

Variables	(1) Total Assets Growth	(2) Total Assets Growth	(3) Gross Total Assets Growth	(4) Gross Total Assets Growth
FirmGDPGrowth, *t-1*	0.009**	0.009**	0.009**	0.008**
	[2.18]	[2.33]	[2.27]	[2.29]
Firm Size, *t-1*	−0.027***	−0.177***	−0.023***	−0.152***
	[−4.72]	[−6.69]	[−4.26]	[−6.03]
Firm Age, *t-1*	−0.050***	−0.017	−0.053***	−0.025
	[−6.72]	[−0.46]	[−7.39]	[−0.72]
Leverage, *t-1*	−0.011***	−0.017**	−0.010***	−0.016***
	[−2.71]	[−2.33]	[−2.79]	[−2.67]
Return on Assets, *t-1*	0.490	0.458	0.429	0.381
	[1.59]	[1.33]	[1.45]	[1.17]
Cash Stock, *t-1*	0.005**	−0.000	0.005**	−0.000
	[2.24]	[−0.20]	[2.32]	[−0.13]
Cash Flow, *t-1*	0.002	−0.000	0.002	−0.001
	[0.85]	[−0.12]	[0.81]	[−0.29]
Credit Line Drawn / Available, *t-1*	0.000	−0.000	0.000	−0.000
	[0.60]	[−1.62]	[0.65]	[−1.64]
Market-to-Book, *t-1*	0.020***	0.031***	0.018***	0.029***
	[3.22]	[2.82]	[3.14]	[3.12]
Geographic Diversification	−0.003	0.112	−0.007	0.086
	[−0.12]	[1.01]	[−0.35]	[0.85]
Property Type Diversification	0.011	−0.056	0.007	−0.065
	[0.49]	[−0.42]	[0.30]	[−0.55]
Gateway Cities Concentration, *t-1*	−0.017	−0.093	−0.014	−0.087
	[−0.86]	[−1.34]	[−0.80]	[−1.36]
Institutional Ownership, *t-1*	0.010	−0.020	0.008	−0.015
	[0.39]	[−0.40]	[0.33]	[−0.31]
Constant	0.472***	2.616***	0.436***	2.289***
	[4.67]	[6.32]	[4.63]	[5.78]
Observations	1531	1531	1530	1530
R-squared	0.188	0.253	0.190	0.248
Property Type Fixed Effects	YES	NO	YES	NO
Firm Fixed Effects	NO	YES	NO	YES
Year Fixed Effects	YES	YES	YES	YES

This table reports the regression results of REIT firm growth (based on the book value of assets) on the firm-level local GDP measure (*FirmGDPGrowth*). In Columns (1) and (3), *t*-statistics based on heteroscedasticity-robust standard errors are reported. In Columns (2) and (4), *t*-statistics are based on standard errors that are clustered at the firm level. The coefficients of firm, property type, and year dummies are suppressed from reporting. Significance at the 1%, 5%, or 10% level is shown with 3, 2, or 1 asterisk, respectively. All variables are defined in Appendix Table 10

market-to-book ratio and cash stock are associated with higher growth, which is in line with our expectations and largely consistent with the literature.

As mentioned earlier, given that the book value of assets of REITs usually underestimates the intrinsic value for REITs, we also measure firm growth using the market

value of assets. The results from Eq. (4) with the growth of the market value of assets as the dependent variable are presented in Table 4.

In Columns (1) and (2), when the dependent variable is total capitalization growth, the estimated coefficients of the *FirmGDPGrowth* are positive (0.015 and 0.013), statistically significant at the 1% level. When the dependent variable is replaced by the current market value growth, as in Columns (3) and (4), the results are similar. These results indicate a positive relationship between the growth of the local economy and the growth of firms that own assets in the areas. In addition, note that the estimated coefficients of *FirmGDPGrowth* are greater than those in Table 3, where the growth of book value of assets is used.

Additional Analysis

The Growth of Equity and Debt

To understand how local GDP growth influences REIT firm growth, we decompose a firm's total assets into two parts (total equity and total debt) and calculate the growth of equity and the growth of debt. Table 5 reports the results when the equity growth and debt growth are used as the dependent variables in the regressions. When the dependent variable is equity growth [Columns (1) and (2)], the estimated coefficients of the *FirmGDPGrowth* are positive (0.013 and 0.017), statistically significant at the 5% level. However, when the dependent variable is debt growth, the estimated coefficients are statistically insignificant, as shown in Columns (3) and (4).

These results indicate that local economic growth helps REITs increase their equity value, but it does not significantly increase the total amount of debt. One possible interpretation of the results is that investors may favor REITs with more assets in high economic growth areas as they perceive those REITs to have better financial performance. Thus, investors have stronger incentives to purchase the REIT stocks, and higher investor demand increases the equity value of the REITs.

The Cross-Section of Stock Returns

In this section, we examine how the local economic growth measure of REITs (*FirmGDPGrowth*) is related to their stock returns *in the cross-section*. This issue is relevant to the findings on growth of equity and debt in the previous section. We attempt to provide additional evidence on why local economic growth helps REITs increase their equity value. If investors do favor those REITs with more assets in high economic growth areas, the demand for those stocks would be high. Thus, we would expect that REITs allocating more assets in higher GDP growth areas should have higher stock returns.

We regress the estimated expected return of REITs, $\widehat{R}_{i,t}$, and the annual abnormal return, $AR_{i,t}$, on their firm-specific local economic growth based on Eq. (5). Panel A of Table 6 presents the results from regressing the expected return on *FirmGDPGrowth*. The estimated coefficients of *FirmGDPGrowth* are 0.041 in all three specifications, significant at the 1% level. Consistent with our expectation, the positive correlation between local economic conditions and the expected stock return suggests that higher economic growth is associated with better stock performance.

Table 4 The Growth of Market Value of Assets

Variables	(1) Total Capitalization Growth	(2) Total Capitalization Growth	(3) Current Market Value Growth	(4) Current Market Value Growth
FirmGDPGrowth, *t-1*	0.015***	0.013***	0.018***	0.016***
	[3.36]	[2.84]	[3.48]	[3.10]
Firm Size, *t-1*	−0.021***	−0.174***	−0.022***	−0.171***
	[−3.69]	[−8.47]	[−3.32]	[−6.80]
Firm Age, *t-1*	−0.049***	−0.024	−0.053***	−0.004
	[−6.92]	[−0.62]	[−6.10]	[−0.09]
Leverage, *t-1*	−0.004	0.004	−0.001	0.005
	[−1.23]	[0.85]	[−0.34]	[1.13]
Return on Assets, *t-1*	0.028	−0.379	0.429	0.278
	[0.12]	[−1.45]	[1.33]	[0.67]
Cash Stock, *t-1*	0.004**	−0.001	0.008***	0.005*
	[2.20]	[−0.46]	[3.10]	[1.82]
Cash Flow, *t-1*	0.005**	0.005	0.001	−0.005
	[2.49]	[1.49]	[0.25]	[−1.26]
Credit Line Drawn/Available, *t-1*	0.000	−0.000	0.000	−0.000
	[0.52]	[−0.86]	[0.06]	[−1.19]
Market-to-Book, *t-1*	0.004	−0.010	0.001	−0.011
	[0.77]	[−1.45]	[0.14]	[−1.37]
Geographic Diversification	−0.022	0.064	−0.013	0.146
	[−1.09]	[0.59]	[−0.56]	[1.20]
Property Type Diversification	−0.010	−0.108	−0.002	−0.069
	[−0.41]	[−1.09]	[−0.06]	[−0.59]
Gateway Cities Concentration, *t-1*	0.005	−0.062	−0.012	−0.087
	[0.26]	[−0.94]	[−0.52]	[−1.07]
Institutional Ownership, *t-1*	0.015	−0.031	0.026	0.011
	[0.64]	[−0.72]	[0.86]	[0.19]
Constant	0.434***	2.617***	0.494***	2.657***
	[4.73]	[8.41]	[4.26]	[6.67]
Observations	1530	1530	1525	1525
R-squared	0.361	0.436	0.308	0.362
Property Type Fixed Effects	YES	NO	YES	NO
Firm Fixed Effects	NO	YES	NO	YES
Year Fixed Effects	YES	YES	YES	YES

This table reports the regression results of REIT firm growth (based on the market value of assets) on the firm-level local GDP growth measure (*FirmGDPGrowth*). In Columns (1) and (3), *t*-statistics based on heteroscedasticity-robust standard errors are reported. In Columns (2) and (4), *t*-statistics are based on standard errors that are clustered at the firm level. The coefficients of firm, property type, and year dummies are suppressed from reporting. Significance at the 1%, 5%, or 10% level is shown with 3, 2, or 1 asterisk, respectively. All variables are defined in Appendix Table 10

In Panel B of Table 6, we regress the abnormal return of stocks on *FirmGDPGrowth*. The results show that firms with more assets in high GDP growth areas have, on average, higher abnormal stock returns, which could not be explained by

Table 5 The Growth of Equity and Debt

Variables	(1) Equity Growth	(2) Equity Growth	(3) Debt Growth	(4) Debt Growth
FirmGDPGrowth, *t-1*	0.013**	0.017**	0.008	0.004
	[2.28]	[2.34]	[1.34]	[0.72]
Firm Size, *t-1*	−0.022**	−0.207***	−0.035***	−0.172***
	[−2.56]	[−5.94]	[−4.12]	[−4.87]
Firm Age, *t-1*	−0.041***	−0.044	−0.065***	−0.020
	[−4.18]	[−0.86]	[−6.38]	[−0.44]
Leverage, *t-1*	0.008	0.026*	−0.018***	−0.028***
	[0.73]	[1.91]	[−3.29]	[−3.16]
Return on Assets, *t-1*	0.278	0.236	1.020**	0.782*
	[0.60]	[0.48]	[2.46]	[1.93]
Cash Stock, *t-1*	0.004*	−0.003	0.011***	0.006*
	[1.68]	[−1.11]	[3.17]	[1.68]
Cash Flow, *t-1*	0.002	−0.000	0.003	−0.000
	[0.52]	[−0.01]	[0.88]	[−0.08]
Credit Line Drawn/Available, *t-1*	0.001***	0.000	−0.000	−0.001***
	[2.83]	[1.02]	[−1.16]	[−3.25]
Market-to-Book, *t-1*	0.026**	0.037**	0.023***	0.045***
	[2.12]	[2.26]	[2.84]	[3.35]
Geographic Diversification	−0.016	0.134	−0.005	0.104
	[−0.59]	[0.91]	[−0.16]	[0.71]
Property Type Diversification	−0.004	−0.049	−0.030	−0.111
	[−0.13]	[−0.32]	[−0.87]	[−0.67]
Gateway Cities Concentration, *t-1*	−0.025	−0.069	−0.043	−0.073
	[−0.98]	[−0.65]	[−1.50]	[−0.84]
Institutional Ownership, *t-1*	0.021	−0.052	−0.002	0.030
	[0.61]	[−0.95]	[−0.07]	[0.40]
Constant	0.327**	3.024***	0.578***	2.498***
	[2.30]	[5.69]	[3.96]	[4.60]
Observations	1508	1508	1527	1527
R-squared	0.107	0.189	0.197	0.212
Property Type Fixed Effects	YES	NO	YES	NO
Firm Fixed Effects	NO	YES	NO	YES
Year Fixed Effects	YES	YES	YES	YES

This table reports the regression results of REIT growth of equity and debt on the firm-level local GDP growth measure (*FirmGDPGrowth*). In Columns (1) and (3), *t*-statistics based on heteroscedasticity-robust standard errors are reported. In Columns (2) and (4), *t*-statistics are based on standard errors that are clustered at the firm level. The coefficients of firm, property type, and year dummies are suppressed from reporting. Significance at the 1%, 5%, or 10% level is shown with 3, 2, or 1 asterisk, respectively. All variables are defined in Appendix Table 10

the common market factors. Specifically, the estimated coefficients for *FirmGDPGrowth* in Column (1) is 0.016, and in Column (2) and (3) are 0.017, all being statistically significant at the 1% level.

The cross-sectional regression analysis on stock returns indicates that a portion of a REIT's expected returns and abnormal returns cannot be explained by the common

Table 6 The Cross-Section of Stock Returns

Panel A. Expected Return			
VARIABLES	(1)	(2)	(3)
	Expected Return – 3 Factor Model	Expected Return – 4 Factor Model	Expected Return – 5 Factor Model
FirmGDPGrowth	0.041***	0.041***	0.041***
	[18.85]	[18.34]	[17.50]
Constant	−0.041***	−0.040***	−0.040***
	[−3.94]	[−3.70]	[−3.58]
Observations	1821	1821	1821
R-squared	0.185	0.163	0.158
Panel B. Abnormal Return			
VARIABLES	(1)	(2)	(3)
	Abnormal Return – 3 Factor Model	Abnormal Return – 4 Factor Model	Abnormal Return – 5 Factor Model
FirmGDPGrowth	0.016***	0.017***	0.017***
	[9.65]	[10.38]	[10.96]
Constant	−0.065***	−0.066***	−0.066***
	[−7.83]	[−8.68]	[−8.76]
Observations	1821	1821	1821
R-squared	0.038	0.047	0.050

This table reports the regression results of REIT expected return and abnormal return on the firm-level local GDP measure. *t*-statistics based on heteroscedasticity-robust standard errors are reported in brackets. The coefficients of property type and year dummies are suppressed from reporting. Significance at the 1%, 5%, or 10% level is shown with 3, 2, or 1 asterisk, respectively. All variables are defined in Appendix Table 10

market factors, and it is instead associated with the local economic growth measure of REITs. As the property values and locations of the assets are different for each REIT, such information should be unique for each firm and not related to market-wide shocks. Thus, the findings provide additional evidence on why the total equity value of REITs tends to increase with firm-level local economic growth.

To determine whether cumulative stock returns are different between high and low local economic growth firms, we construct portfolios by sorting REITs based on their previous-year *FirmGDPGrowth* and examine the cumulative return differentials for a three-year period after the portfolio formation. Figure 3 plots the cumulative return differentials.

Based on the medium cumulative returns, the portfolios that consist of low *FirmGDPGrowth* REITs significantly underperform the portfolios that consist of high *FirmGDPGrowth* REITs. Specifically, the three-year cumulative return differential between the portfolio consisting of the bottom 30% (20%) of *FirmGDPGrowth* and the portfolio consisting of the top 30% (20%) is about 3.26% (6.91%), as shown in the left (right) figure. These results are consistent with the findings in Table 6 and suggest

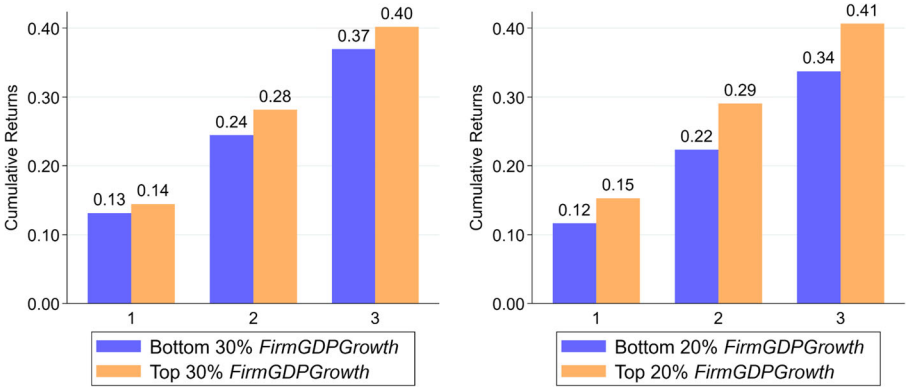

Fig. 3 Cumulative Returns of Stock Portfolios Sorted by the Firm-level Local GDP Growth. This figure illustrates one-year to three-year cumulative returns of stock portfolios sorted by the firm-level local GDP growth (*FirmGDPGrowth*). Each year, we sort REITs based on their previous-year *FirmGDPGrowth*, and then place them into different groups. For instance, if a REIT's *FirmGDPGrowth* is greater than the 70th percentile of the variable in year *t* (or 80th percentile), the firm is included in the high GDP growth portfolio in year *t*. If a REIT's *FirmGDPGrowth* is less than the 30th percentile (or 20 percentile) in year *t*, it is included in the low GDP growth portfolio in year *t*. These portfolios are rebalanced each year. We calculate their one-year to three-year cumulative returns within each portfolio. Observations without *FirmGDPGrowth* and stock return information are excluded. All variables are defined in Appendix Table 10.

that the stock portfolios consisting of high *FirmGDPGrowth* REITs outperform the portfolios consisting of low *FirmGDPGrowth* REITs.

Overall, the findings of our paper are largely consistent with Ling et al. (2019b), who find a negative relation between asset growth rate and the future stock returns of REITs, but the negative effect of asset growth is mainly driven by the growth of debt, not by the growth in equity. While the focus of our paper is not on the effects of high asset growth on firm performance, we find that the firm-level local economic growth measure is positively associated with the equity value of REITs allocating more assets in high growth areas, but not with the total amount of debt. In this sense, our paper is in line with Ling et al. (2019b) as local economic growth and asset location increase the equity value of REITs, not the total amount of debt.

An Instrumental Variable Approach

So far, the analysis suggests a positive relation between firm growth and the lagged local economic growth of REITs. Given the small percentage of a REIT's total property value over an MSA's GDP, it is reasonable to believe that local economic growth affects REIT firm growth (see details in Section 2.2), not the other way around. However, one can argue that the locations and values of assets are an endogenous choice variable for a firm, so growth of a REIT could still influence its spatial patterns of assets. To further address the endogeneity issue, we run the regressions using an IV approach.

As an instrument for *FirmGDPGrowth* of a firm each year, we use the average firm-level GDP growth measure of other firms in the same year (i.e., for each individual

firm, its IV is calculated as the average *FirmGDPGrowth* of firms in each year, excluding that individual firm). While endogeneity concerns may exist between the local economy and firm growth with an individual firm, arguably the *FirmGDPGrowth* of other firms should be independent of the *FirmGDPGrowth* of the individual firm. Table 7 reports the results for the IV approach. In Columns (1) to (4), the coefficients of the fitted value of the *FirmGDPGrowth* in the previous year are all positive (0.009, 0.009, 0.014, and 0.017) and statistically significant at the 5% or 1% level. The main finding of the positive relationship between the local economy and firm growth remains unchanged when the IV approach is used to control for endogeneity issues.

REIT Firm Growth and GDP Growth Based on REIT Headquarter Location

In addition to using the property-based GDP growth measure (*FirmGDPGrowth),* we also adopt an alternative GDP growth measure based on the GDP growth rate of a REIT's headquarter MSA (i.e., *HQGDPGrowth*) for a robustness check.[19] Recent literature shows that the geography of a REIT's property portfolios matters, as investors prefer to invest in REITs headquartered locally and local information affects the linkage between local asset concentrations and return outperformance (e.g., Ling et al. 2019c; Ling et al. 2021). Thus, one can argue that local economic conditions in the headquarters of REITs should play an important role in REIT firm growth. The results on the relationship between REIT firm growth and *HQGDPGrowth* are reported in Table 8. The coefficients of the *HQGDPGrowth* in the previous year are all positive (0.005, 0.004, 0.005, and 0.004). Three out of the four coefficients are statistically significant at the 5% level. These results provide additional evidence that REIT firm growth is positively related to their local economic conditions.

Property Growth and GDP Growth at the MSA Level

For additional robustness checks, we examine whether local economic growth influences the property value growth of all REITs in the MSA. Essentially, the regression analysis is to examine the effect of local economic growth on REIT firm growth *at the MSA level*. Table 9 presents the results based on regressions of REIT property value growth in an MSA on the MSA GDP growth for the US top 100, 50, and 20 MSAs ranked by population.[20] The estimated coefficients for GDP growth at the MSA level are 0.007, 0.006, and 0.009 for the top 100, 50, and 20 MSAs, all statistically significant at the 1% level. The positive relationship between the property value of all REITs in an MSA and the MSA GDP growth suggests that on average, when an MSA experiences high GDP growth, the total property values of REITs in the MSA are higher. This implies that local economic growth indeed helps to increase property values of REITs at the MSA level.

[19] We appreciate an anonymous referee for this suggestion.

[20] The recent literature documents that property portfolios of US equity REITs are concentrated in major MSAs (see Ling, Naranjo, Scheick, 2019).

Table 7 Results Based on the IV Approach

Variables	(1) Total Assets Growth	(2) Gross Total Assets Growth	(3) Total Capitalization Growth	(4) Current Market Value Growth
FirmGDPGrowth, *t-1*	0.009**	0.009**	0.014***	0.017***
	[2.46]	[2.55]	[3.49]	[3.82]
Firm Size, *t-1*	−0.027***	−0.023***	−0.020***	−0.022***
	[−3.88]	[−3.31]	[−3.05]	[−3.00]
Firm Age, *t-1*	−0.050***	−0.053***	−0.049***	−0.053***
	[−5.37]	[−5.63]	[−5.75]	[−5.26]
Leverage, *t-1*	−0.011**	−0.010**	−0.005	−0.002
	[−2.13]	[−2.24]	[−1.18]	[−0.37]
Return on Assets, *t-1*	0.490	0.430	0.030	0.430
	[1.26]	[1.15]	[0.11]	[1.15]
Cash Stock, *t-1*	0.005**	0.005**	0.004**	0.008***
	[2.35]	[2.42]	[2.26]	[3.00]
Cash Flow, *t-1*	0.002	0.002	0.005**	0.001
	[0.77]	[0.74]	[2.21]	[0.25]
Credit Line Drawn / Available, *t-1*	0.000	0.000	0.000	0.000
	[0.57]	[0.60]	[0.48]	[0.07]
Market-to-Book, *t-1*	0.020***	0.018***	0.004	0.001
	[2.64]	[2.63]	[0.69]	[0.13]
Geographic Diversification	−0.003	−0.007	−0.022	−0.013
	[−0.10]	[−0.27]	[−0.88]	[−0.42]
Property Type Diversification	0.011	0.007	−0.010	−0.002
	[0.33]	[0.20]	[−0.31]	[−0.05]
Gateway Cities Concentration, *t-1*	−0.017	−0.014	0.005	−0.011
	[−0.66]	[−0.60]	[0.22]	[−0.40]
Institutional Ownership, *t-1*	0.010	0.008	0.015	0.025
	[0.29]	[0.24]	[0.46]	[0.64]
Constant	0.472***	0.437***	0.436***	0.496***
	[3.64]	[3.46]	[3.64]	[3.76]
Observations	1531	1530	1530	1525
R-squared	0.188	0.190	0.361	0.308
Property Type Fixed Effects	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES

This table reports the regression results using the instrumental variable (IV) approach. It is to address the endogeneity concern over the effects of local economic growth and asset location on REIT firm growth. *z*-statistics are reported in brackets. The coefficients of property type and year dummies are suppressed from reporting. Significance at the 1%, 5%, or 10% level is shown with 3, 2, or 1 asterisk, respectively. All variables are defined in Appendix Table 10

Conclusions

Many believe that the REIT industry will continue to grow and consolidate, and REITs will face much stronger market competition in the future. Meanwhile, REITs hold tens

Table 8 Firm Growth and Local GDP Growth based on REIT Headquarter Location

Variables	(1) Total Assets Growth	(2) Gross Total Assets Growth	(3) Total Capitalization Growth	(4) Current Market Value Growth
HQGDPGrowth, *t-1*	0.005**	0.004**	0.005**	0.004
	[2.33]	[2.18]	[2.28]	[1.56]
Firm Size, *t-1*	−0.030***	−0.025***	−0.020***	−0.022***
	[−5.02]	[−4.36]	[−3.35]	[−3.10]
Firm Age, *t-1*	−0.049***	−0.051***	−0.047***	−0.049***
	[−6.15]	[−6.76]	[−6.20]	[−5.50]
Leverage, *t-1*	−0.015***	−0.013***	−0.007*	−0.005
	[−3.45]	[−3.20]	[−1.84]	[−1.10]
Return on Assets, *t-1*	0.643*	0.598*	0.218	0.614*
	[1.84]	[1.76]	[0.81]	[1.74]
Cash Stock, *t-1*	0.004	0.004*	0.003	0.006**
	[1.62]	[1.69]	[1.38]	[2.20]
Cash Flow, *t-1*	0.001	0.001	0.004	−0.001
	[0.24]	[0.22]	[1.58]	[−0.43]
Credit Line Drawn / Available, *t-1*	0.000	0.000	0.000	0.000
	[0.33]	[0.36]	[0.40]	[0.07]
Market-to-Book, *t-1*	0.024***	0.020***	0.007	0.005
	[3.50]	[3.26]	[1.20]	[0.69]
Geographic Diversification	−0.006	−0.011	−0.027	−0.024
	[−0.29]	[−0.56]	[−1.29]	[−0.98]
Property Type Diversification	0.009	0.005	−0.010	−0.009
	[0.38]	[0.23]	[−0.39]	[−0.29]
Gateway Cities Concentration, *t-1*	−0.014	−0.012	0.010	−0.008
	[−0.66]	[−0.62]	[0.46]	[−0.33]
Institutional Ownership, *t-1*	0.020	0.017	0.029	0.038
	[0.78]	[0.70]	[1.16]	[1.25]
Constant	0.537***	0.486***	0.474***	0.559***
	[4.90]	[4.69]	[4.67]	[4.42]
Observations	1344	1344	1343	1338
R-squared	0.191	0.189	0.355	0.294
Property Type Fixed Effects	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES

This table reports the regression results of REIT firm growth (based on the market value of assets) on the local GDP growth measure (*HQGDPGrowth*) based on REIT headquarter location. *t*-statistics based on heteroscedasticity-robust standard errors are reported in brackets. The coefficients of property type and year dummies are suppressed from reporting. Significance at the 1%, 5%, or 10% level is shown with 3, 2, or 1 asterisk, respectively. All variables are defined in Appendix Table 10

of thousands of commercial properties across different metropolitan areas in the US. Given the local nature of real estate business, one would expect that local economic conditions and asset location are important for the growth of real estate firms. Despite

Table 9 Property Value Growth and GDP Growth at the MSA-level

VARIABLES	(1) Top 100 MSAs	(2) Top 50 MSAs	(3) Top 20 MSAs
GDP Growth, *t-1*	0.007***	0.006***	0.009***
	[4.85]	[2.85]	[3.03]
Constant	0.064***	0.058***	0.046***
	[11.02]	[6.70]	[3.84]
Observations	1455	750	300
R-squared	0.019	0.021	0.062
Number of MSA	97	50	20
MSA FE	YES	YES	YES

This table presents the results of regressions of the MSA-level property value growth of REITs on the MSA's GDP growth for the top MSAs ranked by population. Columns 1, 2, and 3 provide the results for the top 100, top 50, and top 20 MSAs. Robust *t*-statistics are reported, which are clustered at the MSA level and are heteroscedasticity-robust. Significance at the 1%, 5%, or 10% level is shown with 3, 2, or 1 asterisk, respectively. All variables are defined in Appendix Table 10

the importance of the issue, few studies have been done to examine the effects of local economic growth and asset location on REIT firm growth.

To fill this gap, this paper examines the extent to which and how local economic growth and asset location affect REIT firm growth. We construct a firm-level local economic growth measure using granular property-level data of REITs and MSA-level GDP growth data. REIT firm growth (measured using both book value and market value of assets) is positively correlated with the lagged firm-level economic growth measure, suggesting that REITs with more assets in high economic growth areas tend to have higher firm growth. Moreover, local economic growth enhances REIT firm growth mainly through the growth of equity (rather than the growth of debt), as REITs with more assets in higher economic growth areas provide high stock returns to shareholders. Finally, we find a positive relationship between the property value of all REITs in an MSA and the corresponding GDP growth rate of the MSA.

To our knowledge, this is the first study to examine the effects of local economic growth and asset location on REIT firm growth. The findings of the paper highlight the important impacts of local economic conditions on firm growth and suggest that a REIT's asset allocation strategy can play an important role in its long-term growth prospect. To remain competitive in the future marketplace, REIT portfolio managers should carefully evaluate their asset allocation decisions and consider investing in high economic growth areas, instead of simply expanding their footprints or engaging in empire building.

This paper is consistent with and complements the existing literature. Asset location is not only an important determinant of CRE returns, but also a critical factor for a REIT's firm growth and its long-term success. Moreover, our paper adds to the broad firm growth literature as a firm's asset spatial pattern and local economic growth matters in firm growth. The results also shed light on corporate managers and shareholders in other service industries such as hospitality, restaurant, and banking, as asset or branch location is important for their operations and performance. Overall, this paper provides evidence for managers, investors, and policymakers to understand the impacts of local economic growth and asset location on firm growth.

Appendix A1

Table 10 Definition of Variables

Variable	Definition
Firm Size	The natural logarithm of the book value of assets
Year Listed	The natural logarithm of one plus the number of years since the IPO or REIT status established if the IPO year is missing
Leverage Ratio	The ratio of the book value of assets to the book value of equity
Return on Assets	Funds from operations divided by the book value of assets
Cash Stock	Cash and cash equivalents scaled by the book value of assets
Cash Flow	Net operating income and real estate depreciation and amortization scaled by the book value of assets
Credit Line Drawn/ Available	Revolving credit lines drawn down as a percent of revolving credit lines available, as reported by the S&P Global Market Intelligence
Market-to-Book Equity Ratio	The ratio of the market capitalization of the REIT to its total equity
Geographic Diversification	The negative of the Herfindahl Index of REITs, calculated using their assets invested in different NCREIF regions, based on net book value
Property Type Diversification	The negative of the Herfindahl Index of REITs, calculated using their assets invested in different real estate property type, based on net book value
Gateway Cities Concentration	The ratio of real estate assets of a REIT invested in the six Gateway MSAs to its total assets, based on book value. Gateway MSAs are defined as Boston, Chicago, LA, New York, San Francisco, and Washington, D.C.
Institutional Ownership	The percentage of shares are owned by institutions. Data is from the Thomson Reuters 13F database
Total Assets Growth	The log difference of total assets
Gross Total Assets Growth	The log difference of total assets plus accumulative depreciation
Total Capitalization Growth	The log difference of total capitalization of the company, including debt, book value of any preferred stock issued by the company or subsidiaries, and the market value of common stock including the effect of any convertible subsidiary equity, as reported by the S&P Global Market Intelligence
Current Market Value Growth	The log difference of the current market value of the company, where current market value is calculated as net operating income divided by the market-derived capitalization rate
Equity Growth	The log difference of total equity
Debt Growth	The log difference of total debt
Expected Return	The expected return is estimated based on Fama and French (1993) three-factor model, Carhart (1997) four-factor model, and Fama and French (2015) five-factor model. We use the market return, the annual risk factors, and the estimated factor loadings, α, β_1, β_2 and β_3, of the factor models estimated using the full sample to obtain the estimated expected return, $\widehat{R}_{i,t}$
Abnormal Return	The difference between realized return and the expected return is estimated based on the Fama and French (1993) three-factor model, Carhart (1997) four-factor model, and Fama and French (2015) five-factor model. We use the market return, the annual risk factors,

Table 10 (continued)

Variable	Definition
	and the estimated factor loadings, α, β_1, β_2 and β_3, of the factor models estimated using the full sample to obtain the estimated expected return, $\widehat{R}_{i,t}$
Real Estate Property Type	The main real estate property type of a REIT, reported by S&P Global Market Intelligence
FirmGDPGrowth	It is the firm-level aggregated measure of local economic growth for a REIT, calculated as its property-value-weighted average of local GDP growth in all the MSAs where its properties are located. Specifically, the value-weight is the fraction of net book value of properties in an MSA to the total net book value of properties in the US for each REIT in each year. The local GDP growth of an MSA is the annual percentage change of GDP of the MSA as reported by the Bureau of Economic Analysis
HQGDPGrowth	This is an alternative measure of the firm-level local economic growth for a REIT, calculated using the GDP growth in the MSA where a REIT's headquarter is located

Appendix A2

Table 11. Summary Statistics of REIT Property Level Data

Panel A. Number of Properties and MSAs		
Year	Number of Properties by Year	Number of MSAs that have REIT Properties
2001	18,149	308
2002	18,002	315
2003	18,926	328
2004	20,926	358
2005	23,635	361
2006	20,980	329
2007	21,460	337
2008	21,400	333
2009	21,484	333
2010	23,359	352
2011	26,938	380
2012	28,086	384
2013	33,588	432
2014	40,148	472
2015	42,583	484
2016	43,753	490
Average	29,067	393
Total	423,417	
Panel B. Total Net Book Value of Properties in Billion Dollars		
Year	Total Net Book Value by Year	Total Net Book Value by MSA-Year
2001	211.62	4.29
2002	235.33	4.94
2003	253.52	5.28
2004	293.51	6.10
2005	323.35	6.30
2006	331.22	6.49
2007	361.79	7.68
2008	364.15	7.69
2009	357.89	7.54
2010	404.04	8.34
2011	454.93	9.22
2012	475.87	9.28
2013	548.52	10.48
2014	625.55	11.23
2015	666.27	11.53
2016	691.98	11.62
Average	458.41	8.65

This table reports the summary statistics of REIT property-level information from the S&P Global Market Intelligence database. Properties without net book value information are excluded. The sample period is from 2000 to 2016.

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