IPO and SEO Waves in Health Care Real Estate Investment Trusts

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Buttimer, Hyland, and Sanders (“REITs, IPO Waves, and Long-Run Performance,” Real Estate Economics, 33(1), 51 (2005)) find that general real estate investment trusts (REIT) initial public offering (IPO) waves are best explained by the capital demands hypothesis. We examine the capital demand hypothesis, the information asymmetry hypothesis, and the investor sentiment hypothesis for IPO and seasoned equity offering (SEO) waves in a 1978 to 2007 sample of health care REITs. We find evidence against the capital demands hypothesis and support for the information asymmetry hypothesis and the investor sentiment hypothesis. Key words: health care, real estate investment trusts, REITs, stock returns, initial public offering, IPO, seasoned public offering, SEO.

The phenomenon of a “hot issue” market for initial public offerings (IPOs) was first documented by Ibbotson and Jaffe (1975). Since then, the understanding of IPO volume variance has advanced from Ritter’s (1980) correlation of the 1980 IPO “hot market” to Lerner’s (1994) and Rajan and Servaes’ (1997) findings indicating IPO volume variance is related to different forms of market irrationality. Lowry’s (2003) study suggests that explanations for IPO volume variation may be consolidated into three general hypotheses: the capital demands hypothesis, the information asymmetry hypothesis, and the investor sentiment hypothesis.

In accordance with other notable studies on IPO volume fluctuation (e.g., Ritter (1991), Lowry and Schwert (2002)), Lowry (2003) does not include real estate investment trusts (REITs) in her analysis. Perhaps one reason that so many studies exclude REITs from their samples is that, in many ways, a REIT is similar to a closed-end fund. REITs and closed-end funds both have the majority of their investments in assets with observable market values (real estate in the case of REITs, stocks in the case of closed-end funds). Researchers may believe that equity issuances by REITs and closed-end funds do not fit the traditional market factors as non-REIT industrial funds. Another reason that REITs may have been excluded from previous studies on IPO volume variation is that REITs are capital intensive by nature, issuing equity offerings more frequently when compared to other industrial firms. A REIT is required to distribute 95 percent of taxable income to shareholders in the form of dividends. The only way a REIT can expand, then, is by issuing more debt or seeking new funds from capital markets, given that the bulk of any profits that might have been reinvested as retained earnings must be annually distributed. Chan, Erickson, and Wang (2003) find that 162 REIT IPOs accounted for nearly
7 percent of the total dollar amount raised by all IPOs between 1970 and 2000, and that the average gross proceeds were three times greater for REITs than non-REIT industrial firm IPOs over the same period.

In an effort to fill the apparent gap of investigation in REIT IPO volume variation, Buttimer, Hyland, and Sanders (2005)10 (hereafter BHS) examined REIT IPO waves and long-run performance, with a specific goal to determine whether the observable IPO waves could be explained by one (or a combination) of the aforementioned hypotheses from Lowry (2003).11 In their sample of REITs from 1980 to 2001, BHS find three waves of REIT IPO issuance, with Wave 1 occurring in 1985, Wave 2 in 1993 to 1994, and Wave 3 in 1997 to 1998. Furthermore, they argue that these REIT IPO waves are best explained by the capital demands hypothesis.

In this article, we extend the findings of BHS by examining health care REIT IPO and SEO issuances. Helwege and Liang (2003)12 argue that IPO waves tend to exhibit industry and sub-industry concentration. Consistent with Helwege and Liang (2003), we identify variables that specifically relate to the flow of funds to the health care industry and correlate these variables with health care REIT volume.

We empirically examine the three possible hypotheses using initial returns, long-run abnormal returns, long-run wealth relatives, and Fama-French regressions. We find that, contrary to the findings of BHS (2005),13 which documents the capital demands hypothesis as an explanation for general REIT IPO volume variation, health care REIT IPOs are explained better by the information asymmetry hypothesis and the investor sentiment hypothesis.

Background of Competing Hypotheses

Capital Demands Hypothesis

The crux of the capital demand hypothesis is that variation in issuance volume is caused by changes in private companies’ demand for capital. As economic conditions change, private companies will have different investment opportunities. If conditions in the economy are good, firms will want to expand. This demand for more capital induces previously private firms to enter the public markets by issuing IPOs. Consistent with the idea that changes in economic environments are what drive IPO waves, Helwege and Liang (2003) suggest that hot IPO markets tend to occur within specific industries or sub-industries. Thus, an IPO wave may occur within an industry, but not for the larger stock market as a whole. BHS report that newly issued IPOs in a capital demand-driven market would be characterized by waves with an increase in both IPOs and SEOs.

In a health care application setting, suppose the demand for health care facilities rises, driving the demand for increased health care real estate investment in hospitals and other real assets. Health care providers who wish to take advantage of this increased demand would then require additional capital to build the additional hospitals and clinics. This additional required capital comprises the capital demands hypothesis in this specific setting.

Information Asymmetry Hypothesis

Just as an owner of a used vehicle knows a great deal more about its maintenance history and engine condition than a potential buyer does, the information asymmetry
hypothesis explains that the managers of a firm have superior information about that firm relative to the market. Because the market does not have as much information as the managers of the firm, it faces adverse-selection risk. In layman’s terms, with poorer information, the chance is higher that the vehicle (or stock) that one purchases may turn out to be a lemon.

To help justify higher adverse-selection risk, the market discounts IPO prices and high initial returns follow. Lowry and Schwert (2002) explain that “periods of high and rising initial returns tend to be followed by spurts of IPOs, which are themselves followed by periods of lower initial returns.” They find that there are periods of time when the market perceives higher information asymmetry than at other times. During times of higher information asymmetry, the discount on IPO prices rises to be sufficiently large so as to prevent some firms from going public. When information asymmetry is lower, more firms tend to go public and a wave of IPOs follows.

The argument applies directly to a health care setting. If the managers of a health care REIT feel they have superior information to the investing public, they have incentives to issue equity at its highest price. These REIT managers are striving to respond to their fiduciary responsibility of looking out for their current investors to the best of their ability. In an attempt to maximize return for their investors, health care REIT managers may take advantage of superior information and issue equity at optimal times.

Investor Sentiment Hypothesis

Observers who follow the stock market might remember the dot-com boom of 1998 through the first quarter of 2000, which showcased investor exuberance for Internet and technology stocks. Those same observers may also remember the ensuing dot-com bust, when the bubble that this fervor created burst as investors realized that many stocks were overvalued. The investor sentiments hypothesis contends that there are periods of time when investors are overly optimistic and are willing to pay more for companies than they are worth. However, Lowry (2003) posits that in times of low investor sentiment, investors may undervalue firms. The volume of IPOs reflects investor sentiments, with firms taking advantage of high investor sentiments by going public during that time. These optimal times to go public are termed as “windows of opportunity” by Loughran and Ritter (1995). Rajan and Servaes (1997) find that changes in investor sentiment significantly affect IPO volume over time.

This argument also applies directly to health care REITs. Health care REIT managers may observe frothy markets and determine it is a superior time to issue equity. These managers are acting in the best interest of their current investors.

Real Estate Investment Trusts

A real estate investment trust is a fund created exclusively for holding real properties and mortgage-related assets. Publicly traded REITs make it possible for small investors who normally would not be able to purchase a diverse property portfolio to trade properties in the stock market. An investor can buy REIT funds with the intention of buying a pool of real properties and mortgages. Investors can then sell their investment on the open market, the same way they would sell a share of stock.
Since their creation by Congress in the 1960s, the structure and specialization of REITs have changed dramatically in response to new laws and shifting market conditions. Today, three general types of REITs (mortgage, equity, and hybrid) exist as either private or publicly traded entities. Many of these REITs specialize in various property types. REITs that have a diverse profile of properties are traded alongside REITs that specialize in one specific property type, such as hotels, self-storage, multifamily-residential, or health care properties.

Health care REITs are a specific subsector of REITs that invest in real estate primarily serving the health care industry. Terris and Meyer (1995) report that the most common property types that health care REITs invest in are senior housing, independent living, assisted living, hospitals, skilled nursing, medical office buildings, rehabilitation facilities, and life science facilities.

Chan, Erickson, and Wang (2003) and BHS report that REIT IPO activity was prominent in three periods (or waves) in the years 1980 to 2001: 1985 to 1988, 1993 to 1994, and 1997 to 1998. Figure 1 shows the frequency of health care REIT IPOs to compare with the waves reported by BHS. The lightly shaded entries correspond with the wave periods reported by BHS. The darker shaded year represents a possible earlier beginning of the 1993 to 1994 wave that is unique to the health care REIT industry.

The highlighted wave years in Figure 1—1985 to 1988, 1992 to 1994, and 1997 to 1998—represent 61 percent of all IPO issuances in 30 percent of the time period. The fact that any time there has been two IPOs in a given year there has also been an IPO wave indicates that we may expect 2005 to qualify as a wave under the “two IPOs” definition. However, we do not include 2005 as a wave year because there were no instances of IPO issuances in the year previous nor in the year following.

Seasoned equity offerings for health care REITs during the same period are shown in Figure 2. The highlighted wave years include 28 percent of the overall SEO volume, considerably less than the IPO wave volume percentage. This may be an early suggestion that
health care REIT SEOs do not follow the same wave trend in issuances as IPOs.

Figure 3 shows the health care REIT IPO issuances compared with health care REIT SEO issuances from 1978 to 2007. The year with the most SEO issuances, 1998, occurs within one of the IPO wave years. However, the data do not indicate any pronounced waves of SEO issuance; the general trend has been an increase in issuances from 1995 to 2007 when compared to the issuances from 1978 to 1994. In fact, over 70 percent of all health care REIT SEOs were issued after 1994. This makes sense for two reasons. First, in order to issue another round of equity, a company must first issue an IPO. Before 1990, only ten health care REIT IPOs had been issued, with the bulk going public during the 1985 to 1988 wave. Second, investors, believing that the health care REIT market was already saturated with the 1992 to 1994 wave, may have chosen instead to place their funds into offerings by established companies.

Testable Hypotheses

The primary objective of this study is to determine whether the apparent IPO waves in health care REITs correspond with the BHS findings that REIT IPO waves are best explained by the capital demands hypothesis. We examine the abnormal initial and long-run returns of our health care REIT IPO sample. We also examine specific proxies for health care firm demand for capital.

Capital Demands Hypothesis

The capital demand hypothesis contends that a firm’s economic environment spurs new investment opportunity and thus a greater need for capital. The capital demand hypothesis assumes that managers maximize firm value by choosing financing to best suit the needs of the changing conditions. As the aggregate demand for capital increases, more privately held firms decide to go public. If the industry as a whole is affected by this change in economic environment, the firms that issue IPOs would likely earn the industry’s risk-adjusted rate of return. REIT IPO volume explained by the capital demand hypothesis would likely display little or no
abnormal returns, initially and in the long run (BHS, 2005).\textsuperscript{21} Positive correlation to IPO volume with the health care proxies described in the subsequent Equation (7) would also be expected.

**Information Asymmetry Hypothesis**

Lowry and Schwert (2002) show that biases arise in IPO offer prices because underwriters do not fully incorporate all available information when they set offer prices. The market discounts IPO prices to compensate for adverse-selection risk, which leads to high initial returns. The discount to IPO prices are likely smaller during periods of low information asymmetry and larger during periods of high information asymmetry. BHS postulate that a wave explained by the information asymmetry hypothesis would exhibit positive initial abnormal returns, and negative abnormal long-run returns, or at least no positive abnormal long-run returns.

Researchers have also tested the information asymmetry hypothesis by examining the number of SEOs issued during a specified period of time. Bayless and Chaplinsky (1996)\textsuperscript{22} suggest that periods of high information asymmetry will be marked by a lower amount of SEOs. Lowry (2003)\textsuperscript{23} reports that IPO volume is negatively correlated with information asymmetry. If this is the case, then IPOs and SEOs should mimic each other in the volume issued in any specific year or wave. In their study of IPO signaling theory, Ghosh, Nag, and Sirmans (2000)\textsuperscript{24} demonstrate that REITs with higher IPO underpricing are likely to issue SEOs sooner than firms with lower underpriced IPOs. This finding implies that although waves of

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**Figure 3. SEO and IPO Issuances, 1978–2007**

Source: Security Data Company (SDC) and Center for Research in Security’s Prices (CRSP).
IPOs should correspond with waves of SEOs from an information symmetry interpretation, if IPOs are underpriced, a wave of SEOs may occur in response to signaling theory—not in conjunction with the information asymmetry hypothesis or capital demand hypothesis.

**Investor Sentiment Hypothesis**

BHS (2005) conjecture that during a wave explained by investor sentiment, overly optimistic investors are willing to pay more for firms than what they are worth. As a result, lower quality firms are able to issue IPOs. These lower quality firms should have significantly different risk profiles than the established firms in the industry. If investors are irrational, the investor sentiment hypothesis assumes that it could be possible for the lower quality firms to remain in the market even if they always underperform the larger market. REIT volume explained by the investor sentiment hypothesis will likely display positive initial returns, followed by negative long-run abnormal returns.

The returns predictions for each of the hypotheses are summarized as:

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Abnormal Initial Returns</th>
<th>Abnormal Long-Run Returns</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capital demands</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Information asymmetry</td>
<td>+</td>
<td>-/0</td>
</tr>
<tr>
<td>Investor sentiment</td>
<td>+</td>
<td>-</td>
</tr>
</tbody>
</table>

Note that due to the similar predictions for information asymmetry and investor sentiment, the test breaks down to capital demands versus the other two. In our subsequent tests, we are able to explicitly test the currently accepted explanation (via BHS (2005)), which is the capital demands hypothesis.

**Empirical Methods**

**Abnormal Returns**

**Initial Returns.** To calculate initial returns, we employ the BHS (2005) method of taking the natural logarithm of the quotient of the price at the end of the first day of trading from CRSP and the initial offer price.

\[
\text{Initial Return} = \ln \left( \frac{\text{Price}_{\text{Day1}}}{\text{Price}_{\text{Offer}}} \right). \quad (1)
\]

We examine the average initial returns of the entire sample of health care REIT IPO’s, Waves One, Two, and Three, and the Non-Wave Year IPOs. We also report the standard deviation and univariate t-statistic for each sample.

**Long-Run Returns.** To estimate abnormal long-run returns we use two approaches. The first is a market-adjusted return adjusting the IPO REIT returns with a REIT index of non-issuing firms. We construct a REIT index (SIC 4798) and, following Loughran and Ritter (1995), eliminate REITs from the index that have issued equity (IPO or SEO) five years before or after matching with the IPO firm in question.

For the market adjusted return, we begin with the raw return:

\[
R_t = \prod_{r=1}^{36} (1 + r_{it}). \quad (2)
\]

Where \( r_{it} \) is the raw return on firm \( i \) in event month \( t \).

To compute the adjusted return, the compounded benchmark return is subtracted
from the raw return:

\[ AR_i = \prod_{t=1}^{36} (1 + r_{it}) - \prod_{t=1}^{36} (1 + r_{mt}). \]  (3)

Following Ritter (1991), a wealth relative (WR) performance measure is also computed as:

\[ WR = \frac{1 + \text{average 3 year total return on IPOs}}{1 + \text{average 3 year total return on matching firms}}. \]  (4)

If WR is greater than 1, the IPOs outperformed the REIT index. If it is less than 1, then the IPOs underperformed.

Following BHS (2005), we also use a Fama-French model, with a regression of monthly returns of portfolios of health care REIT IPO’s completed during the sample period. We regress the monthly returns against the Fama and French (1993) equity risk factors, Market, SMB, HML, the Fama-French bond factors TERM and PREM, Carhart’s (1997) momentum variable, and the return on the NAREIT index of REITs minus the risk-free rate (\( R_{ft} \)). The \( \text{MOMENTUM} \) variable is a return on a portfolio of long stocks that performed well in the previous period and short stocks that performed poorly in previous period. The \( \text{TERM} \) and \( \text{PREM} \) variables are used because health care REITs may hold mortgages and enter into mortgage obligations. \( \text{TERM} \) is the difference between the long-term government bond return and the one-month Treasury Bill return. \( \text{PREM} \) is the difference in returns for a portfolio of long-term corporate bonds and long-term government bonds. In the Fama-French model, the intercept, \( \alpha \), is interpreted as the performance measure. If \( \alpha \) is significantly positive (negative) this indicates over (under) performance.

\[
\begin{align*}
\text{RET}_{1} - R_{ft} & = \alpha + \beta_{1} \text{NAREIT}_{1} - R_{ft} \\
& + \beta_{2} \text{Market}_{t} - R_{ft} + \beta_{3} \text{SMB}_{t} \\
& + \beta_{4} \text{HML}_{t} + \beta_{5} \text{MOMENTUM}_{t} \\
& + \beta_{6} \text{TERM}_{t} + \beta_{7} \text{PREM}_{t} + \epsilon_{1}.
\end{align*}
\]  (5)

### Capital Demands Hypothesis Model

To examine more specifically the capital demands hypothesis, following Lowry (2003), we use the percentage change in real annual private nonresidential fixed investment, the percentage change in real GDP growth, and the total market SEO volume as proxies in an OLS regression. Considering the specificity of the health care REITs, we also use proxies of average health care REIT SEO volume, and the dollar amount increase in medical spending that likely influence the capital demand of the health care REIT industry. We use items from the spending report that theoretically affect the capital demands (\( \text{CD}_{\text{spending}} \)) of the health care real estate industry as:

\[
\text{CD}_{\text{spending}} = \text{hospital care} + \text{physical & clinical services} + \text{dental service} + \text{nursing home care} + \text{other medical professional services}.
\]  (6)

We then use \( \text{CD}_{\text{spending}} \) in the following OLS model:

\[
\text{IPOVol} = \alpha + \beta_{1} \text{Invst}_{t \to t+1} + \beta_{2} \text{GDP}_{t \to t+1} \\
+ \beta_{3} \text{HCRSEO}_{t+1} + \beta_{4} \text{SEO}_{t} \\
+ \beta_{5} \text{HSI}_{t-1} + \epsilon_{1}.
\]  (7)

where \( \text{Invst} \) is the percentage change in real annual private, nonresidential, fixed investment between year \( t \) and \( t+1 \); \( \text{GDP}_{t \to t+1} \) is the percentage change in real GDP between year \( t \) and year \( t+1 \); \( \text{HCRSEO} \) is the health care REIT SEO volume in year \( t \); \( \text{SEO} \) is
the SEO volume in year \( t \); and \( \text{HSI}_{t-1} \) is \( CD_{\text{spending}} \) in year \( t-1 \).

**Data and Sample Selection**

The sample consists of 23 REIT IPOs and 118 REIT SEOs. Eighteen of the 23 IPOs and 100 of the SEOs are taken from Security Data Company’s (SDC) New Issues database from the years 1970 to 2007. The remainder of the IPOs and SEOs in the sample are taken from the University of Chicago’s Center for Research in Security Prices (CRSP). The sample firms were downloaded from SDC and CRSP using the SIC Code 6798. We sort the firms according to health care industry segment description. We then manually search to find any instances of health care firms categorized as unknown in the industry segment description. We compared the sample of health care REITS from SDC to a sample of REITs downloaded from the CRSP database to confirm the availability of price information.

Offer price and offer date data in Equation (1) is taken from SDC, while stock prices for the first day of trading are from CRSP. The data for Equations (2), (3), and (4)—the raw return, benchmark adjusted return, and wealth relative—were downloaded from the CRSP daily returns file. Following a method described in Ritter (1991), the benchmark adjusted returns uses the monthly raw return on a REIT minus the monthly benchmark return. The benchmark is composed of a REIT non-issuing index for an 11-year period. These matched firms form a benchmark of REITs with similar risk factors and sensitivities to the health care REIT IPO and SEO sample.

The \( R_{ft} \), Market, SMB, HML, MOMENTUM, TERM, and PREM data for the Fama-French model was retrieved from Dr. Ken French’s Web site. We retrieved data from the US Department of Health & Human Services National Health Expenditure for the \( CD_{\text{spending}} \) variable in Equation (6). The data for the \( \text{Invst} \) and \( GDP \) variables in the model for Equation (7) were downloaded from the Federal Reserve Economic Data (FRED) database. The \( HC_{\text{RSEO}} \) data were taken from SDC.

**Empirical Analysis**

**Initial Returns, Adjusted Returns, and Wealth Relatives**

We first examine the initial returns, adjusted returns, and wealth relatives in the sample. Recall that BHS postulate that the capital demands hypothesis predicts little or no abnormal initial returns, while the information asymmetry hypothesis and the investor sentiment hypothesis predict significant positive initial returns. The information asymmetry hypothesis predicts non-positive long-run abnormal returns, and one would expect to find negative abnormal returns in issuances explained by the investor sentiment hypothesis.

Figure 4 shows descriptive statistics for the initial return for 13 of the 23 IPOs in our sample (i.e., the 13 firms from SDC with a valid offering price). Descriptive statistics for the equally weighted and value-weighted wealth relative and adjusted return for all of the IPOs in my sample are also listed.

The results of the initial returns provide evidence for the capital demands hypothesis. We find a slightly negative average initial
return that is not significantly different from zero.

The average adjusted returns are positive, but not statistically significant. The absence of any statistical significance suggests that there are no abnormal long-run returns, again providing evidence for the capital demands hypothesis.

The wealth relative values for both the equally weighted and value-weighted computations of the IPO sample are not statistically significant. These wealth relatives indicate positive long-run abnormal returns (recall that if the wealth relative is greater than one, the IPOs outperformed the REIT benchmark and if it is less than one, then the IPOs underperformed), but not at any level of statistical significance. In his study of three-year holding period returns for 1,526 IPO firms in 1975 to 1984, Ritter (1991)\(^{36}\) finds a significant underperformance, with an average wealth relative of 0.831. The lack of significance in the abnormal returns of the wealth relative variables shown in Figure 4 goes contrary to Ritter’s (1991) negative trend and points to further evidence for the capital demand hypothesis.\(^{37}\) BHS (2005)\(^{38}\) posit that the capital demand hypothesis would exhibit little or no abnormal returns.

When the sample is separated into groups corresponding to the IPO waves described in Section II, evidence for the capital demands hypothesis becomes less clear. Figure 5 shows descriptive statistics for initial returns, the equally weighted and value-weighted wealth relative, and the equally weighted and value-weighted-adjusted return for Wave 1, Wave 2, and Wave 3 of the health care REIT IPO sample. The median p-value is used to control for small sample sizes that may not follow a normal distribution. The value is derived from a Wilcoxon non-parametric sign test.

Wave 1 accounts for just over 30 percent of the IPO volume of the sample. The equally weighted wealth relative and equally weighted adjusted return means show abnormal positive returns for Wave 1, which, as mentioned earlier, gives credence to the capital demands hypothesis. The mean of 1.398 of the equally weighted wealth relative is statistically significant at the 10 percent level. The average equally weighted adjusted return of 0.339 is also statistically significant at the 10 percent level.
However, Wave 2 and Wave 3 each exhibit negative abnormal returns in both the wealth relative and adjusted returns. The mean value-weighted wealth and value-weighted adjusted return for Wave 2 are statistically significant at the 10 percent level. Wave 3’s equally weighted and value-weighted adjusted returns and wealth relatives are statistically significant at the 5 percent level.

The negative long-run abnormal performance in Wave 2 and Wave 3 are evidence against the capital demands hypothesis. BHS (2005) hypothesize that negative long-run abnormal returns would either be explained by the information asymmetry hypothesis or the investor sentiment hypothesis.

The returns of the non-wave years in Figure 5 follow the pattern of Wave 1. The equally weighted and value-weighted wealth relative’s means are not statistically significant, indicating no significant abnormal return.

Although the mean wealth relative returns of 1.34 and 1.07 shown in Figure 4 give evidence for the capital demand hypothesis, the average returns when IPOs are separated into waves tell a different story. The wealth
relative means of Wave 1 and the Non-Wave Years correspond with findings indicative of the capital demands theory, but the statistically significant wealth relative means and adjusted returns in Wave 2 and Wave 3 are consistent with results explained by either the information asymmetry hypothesis or the investor sentiment hypothesis. These findings indicate an intertemporal pattern for health care REITs that is not demonstrated in the general REIT population.

An examination of the seasoned equity offerings of health care REITs may help determine whether the capital demands hypothesis, information asymmetry hypothesis, or investor sentiment hypothesis explains the waves of IPOs in our sample. The capital intensive nature of real estate and a REIT’s required high dividend payout ratio make it such that REITs must engage in constant capital raising activities. Hsieh, Poon, and Wei (2000) find that REITs use short-term debt and common stock more than long-term debt and convertible debt when they raise capital.

Assuming a continual growth, the tendency of REIT managers to seek to raise capital in the stock market necessitates subsequent SEOs after an initial offering. Ghosh, Nag, and Sirmans (2000a) give evidence towards a link between REIT IPO and SEOs in a sample of REITs from 1992 to 1996. They find that the pricing of SEOs reflects reduced information asymmetry through repeated security issues. In an analysis of pre-1990 and post-1990 REITs, they also find support for the notion that information asymmetric explanations of IPO pricings are valid for SEOs as well.

Figure 6 shows a sample of health care REIT SEOs from 1978 to 2007. The issue dates and initial offer prices were obtained from SDC and the stock prices for the days of trading were downloaded from the CRSP database.

Consistent with the IPO sample shown in Figure 4, health care REIT SEOs experienced positive abnormal returns. The equally weighted wealth relative of 1.180 is statistically significant beyond the 5 percent level. A positive abnormal equally weighted adjusted return of 0.167 is also statistically significant. The initial return, though not statistically significant, is slightly positive; however, the return is so slight that it corresponds with the capital demands hypothesis expectation of little or no abnormal initial returns.

### Table 1: Health Care REIT SEO Returns, 1978–2007

<table>
<thead>
<tr>
<th>Variable</th>
<th>Observations</th>
<th>Mean</th>
<th>t statistic</th>
<th>P-value</th>
<th>Median</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Return</td>
<td>104</td>
<td>0.006</td>
<td>1.47</td>
<td>0.144</td>
<td>0.000</td>
<td>-0.113</td>
<td>0.327</td>
<td>0.040</td>
</tr>
<tr>
<td>Wealth Relative-Eq Wt</td>
<td>116</td>
<td>1.180**</td>
<td>2.45</td>
<td>0.016</td>
<td>1.011</td>
<td>0.321</td>
<td>8.434</td>
<td>0.792</td>
</tr>
<tr>
<td>Wealth Relative-Val Wt</td>
<td>116</td>
<td>1.014</td>
<td>0.26</td>
<td>0.794</td>
<td>0.938</td>
<td>0.245</td>
<td>6.111</td>
<td>0.557</td>
</tr>
<tr>
<td>Adjusted Return-Eq Wt</td>
<td>116</td>
<td>0.167**</td>
<td>2.36</td>
<td>0.020</td>
<td>0.016</td>
<td>-1.093</td>
<td>6.313</td>
<td>0.759</td>
</tr>
<tr>
<td>Adjusted Return- Val Wt</td>
<td>116</td>
<td>-0.009</td>
<td>-0.13</td>
<td>0.897</td>
<td>-0.094</td>
<td>-1.138</td>
<td>5.990</td>
<td>0.714</td>
</tr>
</tbody>
</table>

Notes: Data for the initial prices, adjusted return, and benchmark index used to compute the wealth relative are taken from the CRSP database. The offer price for the initial returns is taken from SDC.

** Statistical significance at the 5 percent level.
The positive average wealth relatives and equally weighted adjusted returns of the aggregate health care REIT SEO sample conform to the expectations of the capital demands hypothesis. Figure 7 shows the sample of health care REIT SEOs from Figure 6 segregated into wave years.

The results from Wave 1 are similar to the IPO sample results in Figure 5. Neither the wealth relatives nor the adjusted returns are statistically significant. In addition, the equally weighted and value-weighted wealth relatives show conflicting results, with the equally weighted mean indicating a positive abnormal return and the value-weighted mean indicating a negative abnormal return. The Wave 1 equally weighted adjusted return is positive at 0.168, while the value-weighted adjusted return is negative at –0.210. The conflicting results and lack of statistical significance in Wave 1 indicates that there was little or no abnormal returns, evidence for the capital demands hypothesis in Wave 1.

The absence of abnormal returns in Wave 1 of the IPO sample in Figure 5 and the Wave 1 SEO sample in Figure 7 do not give convincing evidence of abnormal returns, consistent with the capital demands hypothesis.

The health care REIT SEOs in Wave 2 exhibit negative long-run abnormal returns.
The mean equally weighted and value-weighted wealth relatives are both less than one, with values of 0.913 and 0.915, respectively. These averages are statistically significant beyond the 5 percent level. The average equally weighted and value-weighted adjusted-returns are –0.145 and –0.141, respectively. These values are statistically significant beyond the 5 percent level.

The mean returns of Wave 3 are similar to the results for Wave 2. Again, the mean equally weighted and value-weighted wealth relatives were both less than one, with values of 0.881 and 0.782, respectively. These averages are statistically significant beyond the 5 percent level. The average equally weighted and value-weighted adjusted returns are –0.129 and –0.270, respectively. The mean equally weighted adjusted return is statistically significant beyond the 5 percent level, while the mean value-weighted adjusted return is statistically significant beyond the one percent level.

Given that the capital demands hypothesis predicts no long-run abnormal returns, or at least positive long-run abnormal returns, the negative long-run abnormal returns of Waves 2 and 3 for both IPOs and SEOs is strong evidence against the capital demands hypothesis. The negative long-run abnormal returns exhibited in Wave 2 and Wave 3 are better explained by the information asymmetry hypothesis and the investor sentiment hypothesis.

Findings from Ghosh, Nag, and Sirmans (2000b) corroborate the idea that due to differences in organization structure, management style, and institutional ownership of stock between pre-1990 and post-1990 REITs, more information asymmetry existed in post-1990 REITs. Ghosh, Nag, and Sirmans (2000b) examined underpricing of SEOs during pre-1990 and post-1990 periods, and found that post-1990 REIT SEOs are more underpriced than pre-1990 REIT SEOs, indicating more information asymmetry for post-1990 REITs.

The positive abnormal, or no abnormal, long-run returns in Wave 1 (pre-1990) and the negative abnormal long-run returns of Wave 2 and Wave 3 (post-1990) of health care REIT IPOs and SEOs correlate with the findings of Ghosh, Nag, and Sirmans (2000b) that post-1990 REITs are marked by more information asymmetry than pre-1990 REITs. We interpret this pattern as evidence for the information asymmetry hypothesis for Wave 2 and Wave 3. The positive long-run abnormal returns, or at least conflicting results that may indicate no long-run abnormal returns, is evidence that Wave 1 may be explained by the capital demands hypothesis.

Fama-French Regression

We have demonstrated that health care REIT IPO and SEO waves exhibit little or no abnormal returns in Wave 1 and in the aggregate IPO and SEO samples, and exhibit negative long-run abnormal returns in Wave 2 and Wave 3. In their study of REIT IPO waves, BHS (2005) use a Fama-French (1993) factor regression model on a portfolio of REITs to test for abnormal returns.

We use a Fama-French factor on a 1978 to 2007 sample of health care REIT IPOs and SEOs with the same variables that BHS (2005) employ in their study. Figure 8 shows the results for the regression on IPOs (from our previous Equation 5).

The Intercept variable is a measure of the long-run abnormal return. The results in Figure 8 show a statistically significant
negative long-run abnormal return of \(-0.068\)
for the Intercept variable. This negative abnormal return is further evidence for the information asymmetry or investor sentiments hypothesis. This negative abnormal return also differs markedly from the results of BHS (2005), which indicate no statistically significant abnormal returns in the overall REIT market, nor in any waves. BHS finds that the NAREIT-Rf value of 0.7517 is statistically significant beyond the one percent level in a five-year equally rated portfolio Fama-French regression. The health care REIT sample shown in Figure 8 has a similar value of 0.810 and is also significant beyond the one percent level.

We also perform the Fama-French regression on a portfolio of 1978 to 2007 health care REIT SEOs, with the results reported in Figure 9.

Figure 8. Health Care REIT IPO Factor Regressions, 1978–2007

<table>
<thead>
<tr>
<th>Variable</th>
<th>Observations</th>
<th>Mean</th>
<th>t statistic</th>
<th>P-value</th>
<th>Median</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>23</td>
<td>-0.068**</td>
<td>-2.21</td>
<td>0.038</td>
<td>-0.018</td>
<td>-0.533</td>
<td>0.113</td>
<td>0.148</td>
</tr>
<tr>
<td>NAREIT-Rf</td>
<td>23</td>
<td>0.810***</td>
<td>13.02</td>
<td>&lt;.001</td>
<td>0.929</td>
<td>-0.053</td>
<td>1.101</td>
<td>0.299</td>
</tr>
<tr>
<td>Market-Rf</td>
<td>23</td>
<td>-0.002**</td>
<td>-1.94</td>
<td>0.065</td>
<td>-0.001</td>
<td>-0.015</td>
<td>0.010</td>
<td>0.006</td>
</tr>
<tr>
<td>SMB</td>
<td>23</td>
<td>-0.001</td>
<td>-0.45</td>
<td>0.661</td>
<td>0.000</td>
<td>-0.027</td>
<td>0.011</td>
<td>0.007</td>
</tr>
<tr>
<td>HML</td>
<td>23</td>
<td>0.001</td>
<td>0.35</td>
<td>0.727</td>
<td>0.001</td>
<td>-0.016</td>
<td>0.016</td>
<td>0.008</td>
</tr>
<tr>
<td>Momentum</td>
<td>23</td>
<td>0.001</td>
<td>0.41</td>
<td>0.684</td>
<td>0.000</td>
<td>-0.012</td>
<td>0.051</td>
<td>0.012</td>
</tr>
<tr>
<td>TERM</td>
<td>23</td>
<td>0.518</td>
<td>2.3</td>
<td>0.032</td>
<td>0.480</td>
<td>-1.059</td>
<td>3.896</td>
<td>1.082</td>
</tr>
<tr>
<td>PREM</td>
<td>23</td>
<td>-1.46***</td>
<td>-2.86</td>
<td>0.009</td>
<td>-0.715</td>
<td>-9.607</td>
<td>2.320</td>
<td>2.447</td>
</tr>
</tbody>
</table>

Notes: The dependent variables of this regression are the monthly return minus the risk-free rate of the portfolio of 1978–2007 health care REIT IPOs. NAREIT-Rf is the return on the NAREIT index minus the risk-free rate. Market-rf is the return on the market index minus the risk-free rate. The independent variables Market-Rf, SMB, HML, TERM, and PREM are as described in Fama and French (1993). Momentum is as described in Carhart (1997).

**, *** Statistical significance at the 10, 5, and 1 percent levels.

Figure 9. Health Care REIT SEO Factor Regressions, 1978–2007

<table>
<thead>
<tr>
<th>Variable</th>
<th>Observations</th>
<th>Mean</th>
<th>t statistic</th>
<th>P-value</th>
<th>Median</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>116</td>
<td>-0.088</td>
<td>-1.13</td>
<td>0.259</td>
<td>-0.009</td>
<td>-8.839</td>
<td>0.525</td>
<td>0.831</td>
</tr>
<tr>
<td>NAREIT-Rf</td>
<td>116</td>
<td>0.718***</td>
<td>3.39</td>
<td>0.001</td>
<td>0.952</td>
<td>-23.384</td>
<td>2.098</td>
<td>2.284</td>
</tr>
<tr>
<td>Market-Rf</td>
<td>116</td>
<td>0.002</td>
<td>0.65</td>
<td>0.518</td>
<td>0.000</td>
<td>-0.192</td>
<td>0.353</td>
<td>0.038</td>
</tr>
<tr>
<td>SMB</td>
<td>116</td>
<td>0.000</td>
<td>0.15</td>
<td>0.884</td>
<td>-0.001</td>
<td>-0.058</td>
<td>0.225</td>
<td>0.023</td>
</tr>
<tr>
<td>HML</td>
<td>116</td>
<td>0.003</td>
<td>0.45</td>
<td>0.657</td>
<td>0.000</td>
<td>-0.274</td>
<td>0.655</td>
<td>0.067</td>
</tr>
<tr>
<td>Momentum</td>
<td>116</td>
<td>0.003</td>
<td>1.31</td>
<td>0.191</td>
<td>0.000</td>
<td>-0.020</td>
<td>0.215</td>
<td>0.028</td>
</tr>
<tr>
<td>TERM</td>
<td>116</td>
<td>1.091</td>
<td>1.19</td>
<td>0.235</td>
<td>0.114</td>
<td>-2.315</td>
<td>104.912</td>
<td>9.846</td>
</tr>
<tr>
<td>PREM</td>
<td>116</td>
<td>-0.595</td>
<td>-1.6</td>
<td>0.113</td>
<td>-0.159</td>
<td>-35.821</td>
<td>10.438</td>
<td>4.007</td>
</tr>
</tbody>
</table>

Notes: The dependent variables of this regression are the monthly return minus the risk-free rate of the portfolio of 1978–2007 health care REIT SEOs. NAREIT-Rf is the return on the NAREIT index minus the risk-free rate. Market-rf is the return on the market index minus the risk-free rate. The independent variables Market-Rf, SMB, HML, TERM, and PREM are as described in Fama and French (1993). Momentum is as described in Carhart (1997).

*** Statistical significance beyond the 1 percent level.
The abnormal returns in the SEO sample are negative, but not statistically significant. Once again, the NAREIT-Rf rate is statistically significant beyond the one percent level. Intuitively, this correlation makes sense because a return specifically for REITs is likely to have positive correlation with the health care REIT IPO and SEO samples.

The statistically significant abnormal negative long-run returns of the Health care REIT IPO Fama-French regression provide more evidence against the capital demands hypothesis and in favor of the information asymmetry or investor sentiment hypothesis. These negative findings are consistent with non-REIT IPO and SEO findings as in Ritter (1991)44 and Loughran and Ritter (1995).45

In summary, the Intercept variable from the Fama-French regression of health care REIT IPOs summarized in Figure 8 is evidence against the capital demands hypothesis. A statistically significant negative long-run return better explains the information asymmetry hypothesis or the investor sentiment hypothesis.

**Capital Demands Hypothesis Model.** To further investigate the findings of BHS as they apply to health care REITs, we construct a regression model expressing the IPO volume in a given year as a function of health care REIT SEO volume, total market SEO volume, national health care spending measures, and two proxies Lowry (2003)46 uses to test the capital demand hypothesis—change in GDP and change in fixed investment.

The model is described as:

\[
IPO_{vol} = \alpha + \beta_1 Invst_{t \to t+1} + \beta_2 GDP_{t \to t+1} + \beta_3 HCRSEO_{t+1} + \beta_4 SEO_t + \beta_5 HS_{t-1} + \epsilon
\]  

(8)

where

- \(IPO_{vol}\) health care REIT IPO volume in year \(t\)
- \(Invst_{t \to t+1}\) percentage change in real annual private, nonresidential, fixed investment between year \(t\) and \(t+1\)
- \(GDP_{t \to t+1}\) percentage change in real GDP between year \(t\) and year \(t+1\)
- \(HCRSEO_{t+1}\) health care REIT SEO volume in year \(t\)
- \(SEO\) stock market SEO volume in year \(t\)
- \(HS_{t-1}\) CDspending from Equation (6) lagged one year.

Data for the \(HSI\) independent variable come from the Department of Health and Human Safety National Health Expenditures Accounts.47 The data measure the amount of spending for services related to the health care industry. The results of the regression are shown in Figure 10.

With variance inflation factors less than two, the results are not problematic with multicollinearity. If the assumptions of the capital demands hypothesis hold, one would expect to find that the independent variables statistically influence the dependent variable. Changes in \(Invst\) and \(GDP\) would influence IPO volume because more capital is needed to invest in periods where economic conditions are experiencing growth, and less would be needed in times of decline. The \(HCRSEO\) volume would correlate to IPO volume in a period explained by the capital demands hypothesis because the same opportunities from economic change that necessitate new capital for investment in IPOs would influence seasoned firms that issue SEOs. One would expect that increases in
Figure 10. Ordinary Least Squares of IPO Volume in a Sample of Health Care REIT IPO and SEOs Between 1978 and 2007

<table>
<thead>
<tr>
<th>Variable</th>
<th>Parameter Estimate</th>
<th>Standard Error</th>
<th>t Value</th>
<th>P Value</th>
<th>Variance Inflation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>0.771</td>
<td>0.290</td>
<td>2.660</td>
<td>0.009</td>
<td>0.000</td>
</tr>
<tr>
<td>INVST</td>
<td>0.004</td>
<td>0.017</td>
<td>0.230</td>
<td>0.815</td>
<td>1.340</td>
</tr>
<tr>
<td>GDP</td>
<td>0.187**</td>
<td>0.077</td>
<td>2.430</td>
<td>0.017</td>
<td>1.601</td>
</tr>
<tr>
<td>HCRSEO</td>
<td>0.021</td>
<td>0.029</td>
<td>0.730</td>
<td>0.467</td>
<td>1.738</td>
</tr>
<tr>
<td>SEO</td>
<td>&lt;-0.001</td>
<td>0.001</td>
<td>0.480</td>
<td>0.633</td>
<td>1.838</td>
</tr>
<tr>
<td>HSI</td>
<td>&lt;-0.001***</td>
<td>0.000</td>
<td>-2.840</td>
<td>0.005</td>
<td>1.575</td>
</tr>
<tr>
<td>R-Square</td>
<td>0.153</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adj R-Square</td>
<td>0.119</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes: Data for the INVST and GDP variables were downloaded from the Federal Reserve Economic Data (FRED) database. INVST is the percentage change in real annual private, nonresidential, fixed investment between year t and t + 1. GDP is the percentage change in real GDP between year t and year t + 1. The HCRSEO data was taken from SDC. The SEO data for years 1978–2005 were retrieved from Dr. Jay Ritter’s Web site, and the SEO data for years 2005–07 data were pulled from SDC. Data for the HSI were taken from the U.S. Department of Health & Human Services Web site.
** and *** Statistical significance at the 5 and 1 percent levels.

IPOs would also show increases in SEOs, and vice versa. HSI is a measure of the national spending on specific health care services. Under a capital demands hypothesis model, change in HSI would indicate more growth and investment need in the industry, particularly in the need to purchase more real estate assets. Thus, one would expect a positive correlation between HSI and health care REIT IPO volume.

The results in Figure 10 show that GDP is statistically significant beyond the 5 percent level and positively correlated to health care REIT IPO volume. HSI is statistically significant beyond the one percent level and negatively correlated to IPO volumes. While the remaining variables are positively correlated as predicted by the capital demands hypothesis, none of them is statistically significant.

The results of the regression show only weak evidence for the capital demands hypothesis. GDP is correlated as expected under the hypothesis, but the other variables show no statistically significant positive correlation. The absence of statistical significance in the Invst, HCRSEO, and SEO variables is evidence against the capital demands hypothesis.

For example, the negatively correlated HSI may be seen as evidence against the capital demands hypothesis. One would expect that the more spending that occurs in the industry, the more investment opportunities and greater the need for capital. Health care REIT managers may be more confident about lease agreement renewals and future growth as spending on nationwide health care services increases. HSI negatively correlated with IPO volume is evidence against the capital demands hypothesis.

Conclusion

Buttimer, Hyland, and Sanders (2005, BHS)\textsuperscript{48} find that volume variation in REIT IPOs is best explained by the capital demands hypothesis. In a sample of equity REIT IPOs from 1980 to 2001, they find
that REITs did not exhibit negative abnormal performance documented in other IPOs. We consider at BHS’s findings in a more specific sample of REITs to determine if health care REITs are driven by the same hypothesis.

The capital demands hypothesis predicts no long-run abnormal returns, or at least positive long-run abnormal returns. The information asymmetry hypothesis and investor sentiment hypothesis predict negative long-run abnormal returns. We first evaluate the abnormal returns in a sample of health care REITs to find evidence of long-run abnormal returns. In summary, we find that a method described in Ritter (1991) for finding abnormal returns indicates that health care REITs in my sample experienced positive long-run abnormal returns overall and in Wave 1 (1985 to 1988), but negative long-run abnormal returns in Wave 2 (1992 to 1993) and Wave 3 (1997 to 1998). This suggests that, although the capital demands hypothesis may explain Wave 1, Wave 2 and Wave 3 are more likely to be caused by the information asymmetry or the investor sentiment hypothesis.

Measuring long-run abnormal performance via Fama-French regressions, we find health care REIT IPOs exhibit a negative long-run abnormal performance, suggesting further evidence for the information asymmetry or investor sentiments hypothesis.

We also examine a model with proxies designed to directly test predictions of the capital demands hypothesis. In an OLS regression, we estimate correlations between IPO volume and six independent variables. We find that a positive correlation to GDP is evidence for the capital demands hypothesis; however, a negatively correlated measure of health care spending is evidence against the capital demands hypothesis. The capital demands hypothesis predicts that the same economic conditions that would cause a firm to complete an IPO would also cause other firms to seek more funds through SEOs, with the volume of both rising in times of higher capital demand in the industry. We find no correlation between health care REIT IPO and SEO volume. We also find that a measure of national investment and the volume of overall volume of SEOs in the market are not correlated to health care REIT IPOs. This evidence indicates that the capital demands hypothesis is not a driving cause in health care REIT volume variation.

In conclusion, evidence indicates that, although Buttimer, Hyland, and Sanders (2005) document the capital demands hypothesis as an explanation for general REIT IPO volume variation, health care REIT IPOs seem to be explained better by the information asymmetry hypothesis and the investor sentiment hypothesis.

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14. Lowry and Schwert, supra n.7.
15. Lowry and Schwert, supra n.7, p. 1171.
16. Lowry, supra n.5.
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23. Lowry, supra n.5.
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26. BHS, supra n.10.
27. BHS, supra n.10.
28. BHS, supra n.10.
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32. Ritter, supra n.6.
37. When we eliminate one extreme positive outlier, the WRs align with the abnormal return measures and indicate no significant abnormal performance.
38. BHS, supra n.10.
39. BHS, supra n.10.
43. BHS, supra n.10.
44. Ritter, supra n.6.
45. Loughran and Ritter, supra n.13.
46. Lowry, supra n.5.
48. BHS, supra n.10.