

Abstract. This article investigates the contagious movement of real estate investment trust (REIT) stock prices in response to real estate news related to financial institutions' real estate portfolios. The basic hypothesis is that because real estate assets are traded infrequently, the market has incomplete information about their true value; thus, REIT stock prices react negatively to announcements of poorly performing real estate portfolios of financial institutions. Consistent with the hypothesis, significantly negative reactions to these announcements are found for a portfolio of sixty-nine REITs during the real estate crisis of 1989–91.

Introduction

Evidence on contagion, where the market uses the information about one firm's poor financial performance to infer that similar problems exist with other firms, is just becoming available in the real estate literature. A recent paper by Ghosh, Guttery and Sirmans (1997) shows that announcements by only one bank (insurance company) adversely affected the stock prices of other banks (insurers) and devalued S&L and insurance (bank) stocks, even though there were no discernible events of similar importance affecting the thrift or insurance (banking) industries, or any particular firm within these industries. The exposure of banks, S&Ls and insurance companies to poorly performing real estate assets constitutes a close link between the performance of these firms' publicly traded stocks.¹

This article, an extension of Ghosh, Guttery and Sirmans (1997), examines the impact of declining real estate values on the stock prices of real estate investment trusts (REITs) over the period 1989 through 1991. Because the majority of REIT assets are in the form of real estate equities or mortgages that are collateralized by real estate, contagion likely is prevalent across these publicly traded trusts, as well. The investigation of the valuation impact of an announcement constitutes the first attempt to measure *inter-industry contagion* on REITs. In essence, the exposure of banks and insurance companies to real estate assets during the sample period provides an excellent opportunity to investigate contagion effects across industries, rather than within the same industry.

*School of Business Administration, The University of Connecticut, Storrs, CT 06269-2041 or Chinmoy@sbaserv.sba.uconn.edu.

**College of Business Administration, University of North Texas, Denton, TX 76203-5339 or GUTTERY@UNT.EDU.

***School of Business Administration, The University of Connecticut, Storrs, CT 06269-2041 or cf@sbaserv.sba.uconn.edu.

The results suggest significant stock price responses by REITs to announcements about other poorly performing real estate portfolios. Contagion predicts that an announcement by a single firm about the value of its real estate holdings elicits a price response from other firms in the same industry and in different industries with similar portfolios. Because of non-trading or infrequent trading and the consequent uncertainty as to the market value of real estate assets, investors pay particular attention to corporate and economic events that reveal information about the value of these assets. In this analysis, dates are identified when major announcements in the national press revealed information about lenders' declining real estate values, and an examination is made of the consequent impact on REIT stock values. This allows an examination of whether or not contagion is prevalent.

The Real Estate Downturn of 1989–91

Capozza (1994) labels the 1989–91 financial downturn as "... one of the worst banking crises of recent decades, (suggesting that) real estate played a central role in this credit cycle as overbuilding and regional recessions wreaked havoc with the asset base of banks and other financial institutions."² The real estate crisis began with increased investment by banks, thrifts and insurance companies in real estate properties and mortgages during the early and mid-1980s when real estate values increased. Declining interest rates, an abundant supply of financing for construction, pent-up demand for residential dwellings, industrial plant expansions, increased demand for commercial and office space and favorable tax legislation enacted as early as 1981 all contributed to a building boom throughout most of the 1980s. However, this expansion resulted in greater vacancies, declining rental income and many distressed properties nationwide. Increased uncertainty about future cash flows, coupled with declining income, led to reduced market values. Therefore, borrowers and lenders became increasingly involved in workouts, renegotiations and foreclosures.

When real estate values declined, lenders realized losses in the form of write-offs and charges during the late 1980s and early 1990s. They lowered costs through dividend cuts, wage freezes and reductions, branch office closings and employee layoffs. By 1990, two-thirds of commercial banks' maturing construction loans were not paid off according to the original terms, and more than half of their non-performing loans were either soured real estate loans or delinquent commercial and consumer loans secured by real estate. Similarly, life insurance companies were forced to extend billions of dollars in new loans to real estate developers because declining real estate values often circumvented refinances or rollovers.

Growing concern by regulators and investors about lenders' questionable investment choices led to regulators' requests for more disclosure. New capital requirements, as set forth by the Financial Institutions Reform, Recovery and Enforcement Act of 1989 (FIRREA), significantly reduced the supply of capital provided by commercial banks, thrifts and insurance companies.

Event Dates

Dates are identified when major news articles involving real estate asset valuation appear in *The Wall Street Journal (WSJ)* and/or *The New York Times (NYT)*. Over the period 1989 through 1991, the *WSJ* and *NYT* published numerous articles on the declining value of residential and commercial real estate assets. From these, articles that conveyed new information about the real estate problems facing banking, thrift and insurance firms were identified. Specifically, stock price reactions for equally-weighted portfolios of REITs are examined surrounding eight dates. Brief descriptions of articles around these dates are presented in Exhibit 1.

The investigation of news events over the three years indicates that during 1989 and 1990, the media focused primarily on banks' problems. Insurance companies received increasing attention during 1990 and 1991. The choice of the eight dates was dictated by the following agenda: (1) include announcements about a major firm's real estate problems in the banking or insurance sectors; events on September 24 and October 8, 1990 and November 18, 1991 fall in this category;³ and (2) include announcements that analyze the overall impact of the real estate crisis on banking or insurance firms' current or future performance; the stories on October 16 and December 18, 1989, August 1 and August 21, 1990 and July 24, 1991 satisfy this requirement. Announcements where industry or regulatory experts detail the real estate crisis are included, also. None of these dates' announcements mention the effects of the crisis on REIT stocks.

The stories on October 16, 1989, August 1, 1990 and September 24, 1990 can be categorized as banking related. News coverage on August 21, 1990, October 8, 1990, July 24, 1991 and November 18, 1991 focused on insurance companies. Although the December 18, 1989 announcements involved both banking and insurance firms, they emphasized insurers' real estate problems. In essence, these eight dates include an even representation of bank and insurance firms, as well as stories with both firm-specific and industry-wide ramifications. The inclusion of stories with differing backgrounds allows an investigation of inter-industry contagion effects, and a determination as to whether the magnitude of the price reaction reflects the qualitative characteristics of the announcements. In the next section, hypotheses are developed about inter-industry information transfer regarding non-performing real estate loans and the consequent stock price movements of REITs.

Hypotheses

This study adopts Lang and Stulz's (1992) benign form of contagion to argue that an announcement that reveals negative information about the real estate components of cash flows common to all firms in the industry decreases the market's expectations of the profitability of the industry's firms. Because the entire financial sector was affected by the real estate crisis, the contagion hypothesis can be extended to argue that announcements pertaining to the value of real estate assets of a firm in a specific industry may reveal information about firms in other industries with similar real estate exposures. This is referred to as *inter-industry contagion*.

Exhibit 1
Dates and Summary of Major News Events Concerning
Real Estate Portfolios

Date	Summary of Event
October 16, 1989	Third-quarter earnings of major banks in the Northeast and South trail expectations, due primarily to additions to loan-loss reserves because of depressed real estate markets.
December 18, 1989	Insurance companies will be hurt seriously by real estate losses because of their large exposure to commercial property. This is the first announcement of insurers' real estate problems. Risky real estate lending is a major source of problems for banks, namely those in the Northeast.
August 1, 1990	The Chairman of the FDIC reports that ever-weakening real estate markets, combined with a near record number of bank failures, are likely to produce the third consecutive annual loss for the fund that insures deposits at commercial banks. He attributes the drain to the commercial real estate market's effect on the banking system, and reiterates many banks' weak earnings are directly related to real estate values.
August 21, 1990	Anticipated increases in foreclosures likely will force many insurers to take write-offs, reduce dividend payments, and increase loan-loss reserves because of non-recourse commercial real estate loans.
September 24, 1990	Chase Manhattan sharply cuts its dividend and sets aside in the current quarter more than \$650 million as additional reserves against potential losses on domestic loans, mostly in real estate. Its decision seems to presage additional bad news for the nation's banking sector, and loan-loss reserves by other banks are considered probable. Several large New York banks concede further deterioration in Northeast real estate values. Moody's downgrades Chase's debt.
October 8, 1990	Travelers announces a \$500 million third-quarter loss during trading hours on October 5 and reduces its dividend by 33 percent, due largely to a \$650 million addition to reserves for possible losses on mortgage and real estate investments. Analysts expect its actions to presage similar moves by other companies with substantial mortgage holdings, and might lead them to reconsider their dividend policy. Both S&P and Moody's downgrade Travelers' debt. Most analysts believe the company will have to cut payout again if the real estate market does not recover.
July 24, 1991	Moody's cuts several insurers' ratings because of their real estate exposure. Investors are warned not to acquire insurance company stocks. Mutual Benefit Life's failure is blamed on its poor real estate portfolio's performance.
November 18, 1991	Mutual of New York, reported to have "been troubled by heavy real estate exposure," had withdrawals of over \$900 million during the third quarter of 1991; this was \$500 million more than anticipated. The "run" is blamed by policy and contract holders on its large real estate exposure. Travelers is reported to face an SEC inquiry of its disclosure and accounting practices on its \$15.3 billion real estate portfolio.

Under the inter-industry contagion hypothesis, firms across industries with similar portfolios react negatively when an announcement reveals adverse information about the portfolio of a particular firm or industry. If contagion exists, REITs would react adversely to announcements about real estate problems of banks, insurers and thrifts.

Data and Empirical Model

The analysis is based on a sample of sixty-nine REITs (see the Appendix for a list of the sample trusts), of which forty-two are equity type REITs, fourteen are mortgage REITs and thirteen are hybrids. To be included in the sample, each REIT's daily returns data must be available on the Center for Research in Security Prices (CRSP) tape for the entire sample period.

Excess returns are estimated for individual firms and for equally-weighted portfolios of REITs over three-day and five-day announcement windows, as well as for days -1 , 0 and $+1$, where day 0 represents the announcement day. The cumulative windows are used because the news release is often spread around the announcement day. A multivariate regression model similar to those in Cornett and Tehranian (1990) and Fenn and Cole (1994) is estimated using daily returns data over consecutive trading days starting one hundred days prior to October 16, 1989 and ending twenty days after November 18, 1991. The model measures excess returns by the coefficients of event window dummy variables that are included in a system of market model equations.

For a portfolio of REITs, the following regression is estimated:

$$R_t = b_0 + b_1 R_{S\&P500,t} + b_2 R_{T-Bill,t} + b_3 D_1 + b_4 D_2 + \dots + b_{10} D_8 + e, \quad (1)$$

where:

- R_t = Return on the REIT portfolio on day t , $t = 1, 2, \dots, 712$;
- $R_{S\&P500,t}$ = Return on the S&P 500 on day t ;
- $R_{T-Bill,t}$ = Return on the three-month T-bill on day t ;
- D_1, D_2, \dots, D_8 = Event-window dummies for the eight announcement dates; and,
- e = Error term.

With this specification, the estimated parameters, b_3, \dots, b_{10} , measure average excess returns during the eight event windows, respectively.⁴ The event windows are day -1 to day $+1$ and day -2 to day $+2$ in relation to the announcement dates. To measure the daily average excess returns, the same model is re-estimated with twenty-four dummies (*i.e.*, three dummies for each announcement period). The dummy variables have a value of one during the event period, and zero otherwise.

For each announcement, the procedure involves two tests. First, the daily and cumulative excess returns for portfolios of REITs are estimated and compared to examine inter-industry contagion effects. If the excess returns for REITs are significantly negative, the evidence is consistent with the inter-industry contagion

hypothesis.⁵ Second, excess returns of individual companies are regressed on an event window dummy variable representing a mortgage (hybrid) REIT. A significantly negative relation between excess returns and the mortgage (hybrid) type of REIT supports the notion that equity REITs were less adversely affected by the news than mortgage (hybrid) REITs. These excess returns are also regressed on a variable measuring the asset size of each REIT. A significantly positive coefficient suggests better capitalized REITs were less adversely affected by the real estate crisis than those with less total market capitalization.

Results

Event Study Analysis

The results of the event study analysis are presented in Exhibit 2, including the three-day and five-day cumulative abnormal returns (CARs), and the daily abnormal returns of REITs around the eight announcement dates. Corresponding *t*-Statistics are in parentheses. Twenty-three of the twenty-four three-day CAR, five-day CAR and Day 0 daily returns coefficients are negative. Moreover, seven of the eight event dates' three-day or five-day CARs are significantly negative. Five of the dates have significantly negative CARs over both the three-day and five-day windows. Four of the three-day and five-day CARs' significant reactions were to banking related announcements, six were to insurance-related events and two were to the December 18, 1989 banking and insurance related date. Over the three-day (five-day) windows, REITs in this sample declined, on average, 1.5%(2.3%) to banking announcements and 0.9%(2.1%) to insurance events. Clearly, contagion exists in the REIT market.

Regression Analysis

The event study results demonstrate that REITs were affected adversely by announcements that revealed new information about their real estate holdings. To examine the separate effects of contagion, asset size, and trust type, the following regression model is estimated:

$$CAR3_j = \alpha_0 + \alpha_1 SIZE_j + \alpha_2 MORTGAGE_j + \alpha_3 HYBRID_j + e_j . \quad (2)$$

$CAR3_j$ is the three-day cumulative abnormal return for REIT "j"; α_0 is the intercept term capturing the return of equity type REITs; α_k ($k = 1, 2, 3$) are regression coefficients; $SIZE$ is the natural logarithm of total market capitalization in billions of dollars; $MORTGAGE$ is a dummy variable with a value of 1 if the trust is a mortgage REIT, and zero otherwise; $HYBRID$ is a dummy variable with a value of 1 if the trust is a hybrid REIT and zero otherwise; and e is an error term.

The model is estimated for the pooled data on all eight dates and measures the effect of REIT type and total market capitalization on the three-day CARs. This model provides direct evidence on the degree to which different REIT types are affected by the real estate crisis. Specifically, the abnormal returns are the coefficients of the dummy variables in a SUR model, with returns on the portfolio as the dependent

Exhibit 2
Daily and CARs of Equally-Weighted Portfolios of Sixty-Nine REITs Around
Eight Real Estate Announcements—1989–91

Event Date	Daily Returns	Cumulative Returns
10-13-89	0.31 (0.7)	3-Day CARs = -1.32 (-1.8)*
10-16-89	-1.65 (-3.7)*	5-Day CARs = -1.45 (-1.5)
10-17-89	0.02 (0.1)	
12-15-89	0.07 (0.1)	3-Day CARs = -1.14 (-1.6)*
12-18-89	-0.19 (-0.4)	5-Day CARs = -1.70 (-1.7)*
12-19-89	-1.02 (-2.3)*	
7-31-90	-0.10 (-0.2)	3-Day CARs = -0.56 (-0.8)
8-1-90	-0.09 (-0.2)	5-Day CARs = -2.05 (-2.0)*
8-2-90	-0.37 (-0.8)	
8-20-90	-0.26 (-0.6)	3-Day CARs = -1.16 (-1.6)*
8-21-90	-0.40 (-0.9)	5-Day CARs = -2.90 (-2.8)*
8-22-90	-0.50 (-1.1)	
9-21-90	-1.22 (-2.7)*	3-Day CARs = -2.60 (-3.4)*
9-24-90	-0.70 (-1.6)*	5-Day CARs = -3.25 (-3.2)*
9-25-90	-0.68 (-1.5)	
10-5-90	-0.71 (-1.6)*	3-Day CARs = -1.25 (-1.7)*
10-8-90	-0.87 (-2.0)*	5-Day CARs = -2.65 (-2.7)*
10-9-90	0.33 (0.7)	
7-23-91	0.49 (1.1)	3-Day CARs = 0.10 (0.1)
7-24-91	-0.59 (-1.3)	5-Day CARs = -0.85 (-0.8)
7-25-91	0.20 (0.5)	

Exhibit 2 (continued)
**Daily and CARs of Equally-Weighted Portfolios of Sixty-Nine REITs Around
 Eight Real Estate Announcements—1989–91**

Event Date	Daily Returns	Cumulative Returns
11-15-91	0.16 (0.4)	3-Day CARs = -1.38 (-1.9)*
11-18-91	-0.87 (-2.0)*	5-Day CARs = -2.00 (-2.0)*
11-19-91	-0.67 (-1.5)	

The abnormal returns are the coefficients of the dummy variables in a SUR model, with returns on the portfolio as the dependent variable. The regressors include returns on the S&P 500 Index (a proxy for the market), yields on the three-month T-bill and dummy variables for each of the eight event periods. Each binary dummy variable has value one on the days in the event period, and zero otherwise. The model is run over 712 consecutive trading days from February 24, 1989 through December 17, 1991. The *t*-Statistics are in parentheses.

*Significant at the 10% level or less, two-tailed test.

Exhibit 3
**Heteroskedastically Corrected Estimates for Linear Regressions of CARs of
 Sixty-Nine REITs Around Eight Real Estate Announcements**

Date	Constant	SIZE	MORTGAGE	HYBRID
Oct. 16, 1989	-1.60 (-0.9)	-0.07 (-0.2)	2.41 (1.8)*	0.38 (0.4)
Dec. 18, 1989	-0.43 (-0.2)	0.04 (0.1)	-2.86 (-2.8)*	-1.33 (-0.9)
Aug. 1, 1990	-1.96 (-0.9)	0.30 (0.6)	1.15 (1.5)	-1.33 (-1.1)
Aug. 21, 1990	-0.79 (-0.6)	-0.12 (-0.4)	0.28 (0.3)	-0.94 (-0.7)
Sept. 24, 1990	-4.20 (-1.4)	0.50 (0.8)	-2.25 (-1.3)	0.23 (0.2)
Oct. 8, 1990	-1.04 (-0.5)	-0.07 (-0.1)	1.19 (0.9)	-0.72 (-0.3)
July 24, 1991	0.09 (0.1)	-0.03 (-0.1)	-1.25 (-1.3)	0.38 (0.3)
Nov. 18, 1991	-0.28 (-0.2)	-0.10 (-0.2)	-1.72 (-1.3)	-1.72 (-1.3)

CARs are regressed on total assets and dummy variables for REIT type. *t*-Statistics are in parentheses.

$$CAR3_j = \alpha_0 + \alpha_1 SIZE_j + \alpha_2 MORTGAGE_j + \alpha_3 HYBRID_j + e_j.$$

$CAR3_j$ is the three-day cumulative abnormal return for REIT "*j*"; α_0 is the intercept term capturing the return of equity type REITs; α_k ($k = 1, 2, 3$) are regression coefficients; *SIZE* is the natural logarithm of total market capitalization in billions of dollars; *MORTGAGE* is a dummy variable with a value of 1 if the trust is a mortgage REIT, and zero otherwise; *HYBRID* is a dummy variable with a value of 1 if the trust is a hybrid REIT, and zero otherwise; and *e* is an error term.

*Significant at the 10% level or less, two-tailed test.

variable. The regressors include returns on the S&P 500 Index (a proxy for the market), yields on the three-month T-bill and dummy variables for each of the eight event periods. Each binary dummy variable has a value of one on the days in the event period, and zero otherwise. The model is run over 712 consecutive trading days from February 24, 1989 through December 17, 1991. No ex ante predictions as to the magnitude or signs of the coefficients are made.

Heteroskedastically corrected coefficient estimates (White, 1980) and related *t*-Statistics for the regression model are reported in Exhibit 3. Results suggest three-day CARs are not adversely affected in a significant manner by market capitalization or by REIT type.⁶ Specifically, the constant term, *SIZE*, and *HYBRID* are insignificantly different from zero on all eight event dates, and *MORTGAGE* is significantly greater (smaller) than equity REITs on only the first (second) event date. In summary, this regression model demonstrates that the market uses announcements made by banks, thrifts and insurance companies indiscriminately across REIT type and asset size.

Conclusion

The valuation of real estate assets is difficult because of infrequent trading. As such, financial institutions' exposure to real estate portfolios remains largely unobservable. With the rapid decline in the value of real estate holdings in the late 1980s and early 1990s, financial institutions with large real estate holdings have been forced to take charges and make defensive adjustments in their asset structure. These markdowns afford investors the opportunity to make informed estimates about the value of real estate holdings and to evaluate exposed firms' true worth. Stock price movements are analyzed both to identify when these revaluations are announced and to examine whether the price changes reflect lenders' relative exposure to real estate.

The analyses suggest investors use corporate and economic events that reveal information to estimate the market value of REITs. Around announcements of declining real estate values, REIT stocks sustain significant valuation losses. Total market capitalization and REIT type do not affect excess returns significantly, however. These findings support the conclusion that the market efficiently assesses REITs' and lenders' investment performance.

Appendix

The following sixty-nine REITs comprise the sample, categorized by type of trust. The source is *The Complete Guide to the Real Estate Investment Trust Industry* (1993).

Equity REITs: (42)

American Health Properties

American Realty Trust

Banyan Mortgage Investment Fund

Bay Meadows Operations

Bedford Property Investors

Boddie Noell Properties

Bradley Real Estate Trust

B.R.E. Properties

Burnham Pacific Properties	Meridian Point Realty Trust VII
Commercial Net Lease Realty	Merry Land and Investment
Copley Property	M.G.I. Properties
Duke Realty Investments	Mid-America Realty Investments
Equivest, Inc.	Mission West Properties
Gabelli Equity Trust	M.S.A. Realty Corp.
Grubb and Ellis Realty Income Trust	Nationwide Health Properties
Health Care Property Investments	Nooney Realty Trust
Health Equity Properties	Pacific Gateway Properties
H.M.G. Courtland Properties	Prudential Realty Trust
H.R.E. Properties	Royce Value Trust
I.R.T. Property Company	Santa Anita Realty Properties
Koger Equity	Sierra Real Estate Equity Trust
Landsing Pacific Fund	Southwest Property Trust
Medical Properties, Inc.	Storage Equities, Inc.
Meridian Point Realty Trust IV	Transcontinental Realty Investors
Meridian Point Realty Trust VI	United Dominion Realty Trust

Mortgage REITs: (14)

A.S.R. Investments	Homeplex Mortgage Investments
Capital Housing and Mortgage Properties	Metropolitan Realty Corp.
Capstead Mortgage Corp.	Resort Income Investments
Columbia Real Estate Investments	Resource Mortgage Capital
C.V. REIT, Inc.	Rockefeller Center Properties
C.W.M. Mortgage Holdings	Rymac Mortgage Investment
D.V.L., Inc.	T.I.S. Mortgage Investment

Hybrid REITs: (13)

Americana Hotels and Realty Corp.	Monmouth Real Estate Investments
Arizona Land Income Corp.	Mortgage and Realty Trust
Banyan Strategic Land Fund II	North American Trust
Cousins Properties	One Liberty Properties
Health Care REIT	Presidential Realty Corp #1
L.N.H. REIT, Inc.	Presidential Realty Corp #2
M.I.P. Properties	

Notes

¹ Contagion has received considerable attention in the literature recently, after having been explored in numerous situations, including corporate bankruptcy, the third-world debt crisis and unexpected low earnings. These studies investigate the impact of announcements by one firm on the market value of common stock of other firms in the same industry and find conclusive evidence for contagion. The empirical examination of contagion effects has focused on stock price changes associated with particular announcements and regulatory changes. Lang and Stulz (1992) study intra-industry contagion of bankruptcy announcements. Cornell and Shapiro (1986), Smirlock and Kaufold (1987) and Schoder and Vankudre (1988) examine the stock market response for portfolios of banks to the August 1982 announcement of the Mexican debt

crisis. Cornett and Tehranian (1989) examine stock market reactions to the Depository Institutions Deregulation and Monetary Control Act of 1980 (DIDMCA). Cornett and Tehranian (1990) examine the impact of the Garn-St. Germain Depository Institutions Act of 1982 on commercial banks and S&Ls. Allen and Wilhelm (1988) investigate the valuation effect of DIDMCA on financial institutions.

² The associated problems for lenders were so severe that *The Journal of the American Real Estate and Urban Economics Association* dedicated the entire Spring 1994 issue for academic inquiry into the crisis. Articles in this issue that have direct bearing on this paper include those by Cole and McKensie (1994), Fergus and Goodman (1994) and Peek and Rosengren (1994).

³ A major banking event not included in the analysis is the failure of the Bank of New England in 1991. Analysis of stock price movements around the announcement reveals no significant effect, implying that the event contained no new information. This is attributable to innumerable news stories on banks' real estate crisis during 1989 and 1990. In contrast, as the November 18, 1991 announcement suggests, Mutual of New York's real estate losses were largely unanticipated.

⁴ This specification is similar to the seemingly unrelated regression (SUR) model. As observed by Fenn and Cole (1994), however, the SUR model reduces to a simple ordinary least squares estimation when the variables on the right hand side of each equation are the same.

⁵ While this research does not imply that it explains the entire movement in REIT stock prices, it does lend evidence that unexpected adverse real estate news significantly affects their value.

⁶ Various diagnostics of the regression model were checked. Market capitalization was included as a control variable to examine possible size effects. The results remain unchanged. The correlation matrix also revealed no significant correlation between variables.

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