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Effects of Regulatory and Market Constraints on the Capital Structure and Share Value of REITs: Evidence from the Italian Market

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In contrast to the US experience, most international (European) real estate investments trusts (REITs) are subject to prudential regulation. This paper investigates the effects of prudential regulation on capital structures and consequently, the REIT share values of major legal and market constraints (i.e. leverage limitations, market discount on net asset value (NAV), tax controls) that affect non-US REITs. Italian market data are used for an empirical analysis.

Our hypothesis is that in a constrained environment, the effects on share price significantly depend on the adopted valuation perspective, i.e.if shares are valued by following a NAV or a financial approach.The logic for this hypothesis is that the two valuation methodologies perceive leverage and implied financial risk differently.In particular,we argue that NAV valuation techniques incentivise REITs to maximize leverage regardless of the financial theory which indicates a contrasting impact of debt on the market value of shares.Differences in financial risk perception could also partially explain market price discounts on NAVs.

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The empirical results seem to support these expectations. Almost all Italian REITs tend to increase debt ratios over time. NAV discounts are significantly related to leverage. The discount effect is largely attributable to NAV increases that result from rising debt levels. On the contrary, share market prices tend to be independent from leverage. The latter result may indicate that the classic capital theory applies and current debt ratios do not imply bankruptcy risk. The results have significant policy implications in terms of an optimal regulatory design.

Keywords

REIT regulation; Leverage; NAV discount; REIT capital structure; REIT valuation

1. Introduction

The literature on REIT capital structures largely considers tax issues – the requirement for REITs to pay out high percentages of taxable income in return for enjoying tax free status at the entity level – as the major constraint on financial options of managers, by de facto, reducing their choices to debt and equity financing[1]. This status is consistent with the American market context to which most bibliography is related.

In contrast, most European public REITs and comparable investment vehicles (real estate investment funds, real estate trusts, etc.) are subject to severe prudential regulation and vigilance mainly aimed to protect retail investors. In particular, regulation typically limits the leverage ratio of REITs and defines the mandatory legal structure of the investment vehicle. However, the high regulatory burden is normally largely off-set by a favorable fiscal status of REITs that are normally recognized as tax-free or tax preferred entities[2]. At the same time, market evidence from various countries (e.g. Italy and Great Britain) shows that public REITs typically trade at (deep) discounts on net asset values (NAVs).

The fact that European REITs are *not* constrained-free investment structures from several perspectives suggests that investigation of how the legal context affects the capital structure of REITs should not be limited to tax issues, but also take into consideration, the broader provisions of prudential regulation.

[1] For a recent summary of capital structure theories applied to REITs, see Feng et al. (2007).

[2] For an international overview and comparison of the various REIT structures, the reader may refer to Ernst & Young (2007).

In this context, the objective of the study is to investigate the effects on capital structure, and consequently, on share values of the major legal and market constraints that affect (European and, in particular, Italian) REIT operations.

Three primary controls are considered: (1) leverage limitations; (2) the tax regime, and (3) market price discount on NAVs. NAV discount is not a constraint per se; however, as addressed next, the combination of this phenomenon with the regulatory imposition of NAV as the mandatory valuation criterion for assessing REIT share values results in a de facto limitation of the financial choices of managers[3].

Our key point is that how these legal and market factors influence the capital structure of REITs, and therefore share price, significantly depends on the adopted valuation perspective, i.e. if shares are valued following a NAV or a financial approach. In particular, we argue that from an asset-based (NAV) valuation approach, the above mentioned controls incentivise REIT managers to maximize leverage because of the positive effect of debt on share value under the NAV criterion. This positive effect occurs even though financial theory would indicate that – from a market perspective – too much debt could have a negative impact on the market value (MV) of shares consistent with the perception of financial risk. Such perception is not captured by the NAV – valuation standard, based on the book value of debt. Moreover, if NAV and financial methodologies perceive leverage and price the implied financial risk differently, these differences in valuation perspectives could partially explain market price discounts (in addition to other factors) on NAVs.

The above-described hypothesis with regards to the effects of legal and market constraints on REIT capital structures and share values are empirically tested. The investigation is based on Italian public REIT data which reported daily market prices and half-yearly NAVs for the entire (22) public REIT population from late 1999 (upon listing date) through to December 2007. We first estimate debt trends for all REITs in order to check the basic assumption of increasing leverage ratios over time due to the regulatory constrained environment. We then investigate and test for the relationship between leverage dynamics and REIT share price discounts to reported NAVs by a regression analysis. Regressions are independently repeated for the two NAV discount components (NAV and market price as dependent variables) in order to control for the factor that leads to discount movements of NAV.

Based upon the financial framework outlined in Section 3, we expect debt levels to increase over REIT maturity. Leverage should also be positively related to NAV discounts due to the different financial risk perceptions of NAVs and market prices. The NAVs of REITs should increase as debt ratios rise; leverage effects on market prices (assumed to follow a financial perspective) are more questionable. Moreover, NAV discounts should be

[3] As for Italy and Great Britain (see Table 1).

more strongly related to debt for older than younger REITs, under the realistic assumption – as the Italian case – that REITs established via cash contributions invest in equity capital first.

The positive correlation between NAV discounts and debt could, however, be mitigated by the decreasing residual life of closed-end REITs. This is under the severe assumption that NAVs and market share prices tend to converge as the REITs approach maturity. This tendency (together with others) is verified by a cluster analysis.

The results of the study seem to support initial expectations.

In fact, the outcomes show that because of the legal design of REITs, debt increases over time for all REITs. Leverage is positively related to NAV discounts both in the short- as well as in the long-run; the correlation coefficient tends to be greater for older REITs and lower for younger REITs. NAV discount variations seem to be determined by NAV changes rather than market price reactions to leverage increases.

These results have relevant policy implication both at REIT (i.e. limitations in investment capacity and NAV discount magnification) and the industry levels (i.e. potential multiplication of REIT structures, and inherent transaction and intermediation costs), and suggest amendments to the prudential regulatory rules. In particular, consideration should be given to abolition of the mandatory NAV valuation methodology.

While the empirical results are based upon the analysis of Italian market data and the Italian regulatory regime, they may apply or also be adopted by other European countries that have similar market and regulatory situations (e.g., Great Britain).

The study is structured as follows. Section 2 provides an overview of the legal and market contexts of the principal REIT regimes in Europe; the outline particularly focuses on the Italian regulatory and market structures. This focus is important in order to highlight the main constraints (leverage limitations, market price discounts on NAVs, and taxation) that are addressed in the following analysis. Section 3 summarizes the main theories on capital structures that could explain the behavior of managers in defining financial options and suggests a theoretical analysis of how legal and market constraints alter financial choices. It concentrates on the effects of the forecasted, constrained capital structures on REIT share values both from a NAV and a financial perspective. The study's hypotheses are tested in Section 4 where data are described and an empirical analysis of the Italian market evidence is conducted. Conclusions are drawn in the final section.

2. Regulatory and Market Environments of European REITs

Most European countries have introduced real estate investment trusts or comparable investment vehicles (all of which are termed "REITs") in recent years. As Table 1 shows, two main characteristics are notable[4].

(1) Almost all REIT regimes impose a prudential regulation generally aimed to protect retail investors to whom (public) REITs are generally targeted. Prudential regulation refers to investment restrictions and leverage limitations. Investment policies usually impose a minimum real estate portfolio diversification by limiting asset concentration; leverage restrictions are usually expressed in terms of a maximum debt-to-real estate assets ratio (around 60% on average). No business model seems to dominate the type of organization found in European countries, with REITs being organized either as corporations or open/closed-end trusts. Although closed-end REITs have a finite life, they are in most cases, allowed to redeem outstanding shares and issue new equity during their life[5]. As described below, a key regulatory feature that applies in some countries and affects REIT financial structures, involves share valuation standards. Italy and Great Britain, for example, require REIT shares to be valued on the NAV[6] criterion; REITs are therefore obliged to regularly publish (on a semiannual or yearly basis) the NAV of the property portfolio, with the assets appraised by independent appraisers. Moreover, the same valuation requirement applies also to new share issues despite market price premiums or discounts on NAVs[7]. As explained next, even if often considered a minor detail, this requirement has important implications in terms of the financial choices de facto available to REIT managers.

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[4] A detailed overview of the various REIT regimes is depicted in Appendix 1. Table 1 summarizes their main characteristics.

[5] With respect to market level, it is notable that most REIT structures are public, listing are required in order to promote share liquidity and allow, in the case of closed-end vehicles, investment way-out. Private REITs are usually reserved by regulation to institutional investors [Appendix 1].

[6] The NAV essentially consists of the current aggregate value of total assets (which are real estate values estimated by independent appraisers) less the total liabilities of the company.

[7] U.K. REITs qualify as an investment or trading company. Only investment entities must respect listing rule LR15, which states that "…*closed-ended investment fund may not issue further shares of the same class as existing shares for cash at a price below the NAV per share of those shares unless they are first offered* pro rata *to existing holders of shares of that class.*" [FSA (2008)].

Table 1 Overview of European REITs

Investment Vehicle's Structure, Main Regulatory Provisions, and Taxation								
Country	**Year**	**REIT's Structure**		**Main Regulatory Constraints**			**Taxation**	
		Open-end (*)	Closed-end (*)	Investment Limitations	Leverage Limitations	NAV Mandatory as Share Valuation Method	Mandatory Pay Out Rules	Reit's Income
Belgium (Sicafi)	1995	Yes	--	Yes	Yes	No	Yes	Tax-exempt (Pass-through entities)
France (Siic)	2003/2005	Yes	--	Yes	Yes	No	Yes	Tax-exempt
Germany(G-Reits)	2007	Yes	--	Yes	Yes	No	Yes	Tax-exempt
Italy (i) (Fondi Immob.- Reits)	1994-1998	--	Yes	Yes	Yes	Yes	No/Upon articles of association	Tax-exempt
Italy (ii) (Siiq)	2007	Yes	--	Yes	No	No	Yes	Largely tax-exempt
Netherlands (FBI)	1969	Yes	Yes	Yes	Yes	No	Yes (100%)	Tax-exempt
UK (UK-Reits)	2007	Yes	--	Yes	Yes	Yes	Yes (100%)	Tax-exempt

Notes: (*) Open-end / Closed-end refers to the substantial classification of the REIT structure, not to the legal form. From a regulatory point of view, no REIT is structured as an open-end entity.

Table extracted from data reported in Appendix 1. Sources are reported in the same Appendix.

(2) The severe regulatory burden is largely compensated by a favorable tax-status of REITs in all investigated countries. Subject to national differences, real estate investment vehicles are normally considered as pass-through entities at the entity level, while different taxation rules apply at the investor level mainly based on whether the investors are retail investors or institutions, with small investors being generally taxed at preferred brackets. With a few exceptions (Italy), compulsory pay-out ratios are imposed in order for the entities to benefit from reduced taxation (see Table 1)[8]. Taxation affects capital structure by influencing the cost of debt, varying cash-flows available for investments, and altering the entity's valuation.

The favorable fiscal and supervisory framework has enabled European REITs to establish themselves as a dominant investment vehicle for financial real estate. As depicted in Table 2, at the end of 2007, the market capitalization of public REITs in the five selected countries amounted to Euro 104.7 billion[9,10], which is equal to 73.4% (compounded) of the local listed real estate market [AME (2007), Italian Stock Exchange (2007)].

Table 1 The European REIT Market

December 2007			
Listing Country	**Number of Companies**	**Sector Mkt Cap bn Euro**	**% of Local Listed Real Estate**
Belgium	14	4.1	78.8%
France	32	48.4	81.4%
Germany	2	0.6	2.8%
Netherlands	7	9.0	78.5%
Great Britain	18	36.6	55.7%
Italy	22	6.0	49.4%
Overall	95	104.7	73.4%

***Sources*:**
AME Capital, Global REIT Research, December 2007. Data used with permission.
Italian Stock Exchange, National Companies Capitalisation, December 2007.
Adaptations by the authors.

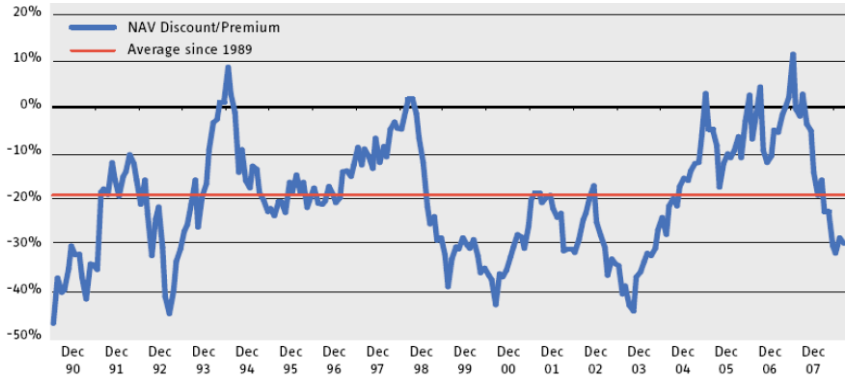
[8] Pay-out requirements are usually based on the ordinary net income of a REIT, while profits from the disposal of assets are commonly not subject to mandatory distribution [Appendix 1].

[9] Data were obtained by using the average GBP/Euro exchange rate of December 2007 available on the Bank of Italy website.

[10] Data do not consider German REITs and Italian SIIQ (Real Estate Listed Corporations), depicted in Table 1. German REITs were established in 2007. At the end of 2007, only two German REITs were listed in the German Stock Exchange; market capitalization was limited to Euro 712 million (April 2008) [Deutsche Börse (2008)]. At the same year end, only one Italian SIIQ (Real Estate Listed Corporation) was listed.

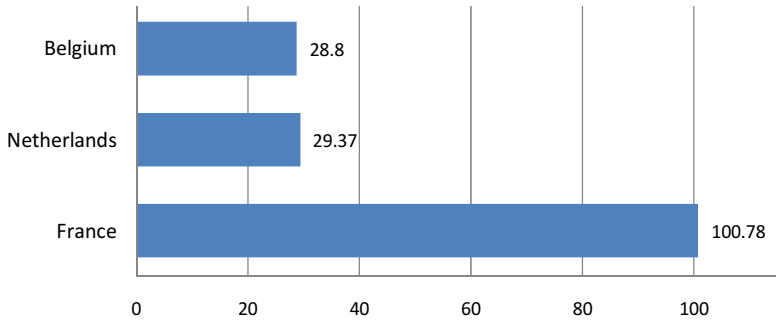
Market evidence is characterized by another key feature relevant to capital structures of public REITs: the market prices of REIT shares deviate from their NAVs (which show premiums or discounts on NAV). Market behavior is, however, quite differentiated at the national level; Italian and British investment vehicles, that account for almost 40.7% of the European REIT market, typically show persistent price discounts on NAV (Figure 1 and Table 3), while French, Belgian and some Dutch REITs quote at premium (Figure 2).

Figure 1 FTSE EPRA UK Index - NAV Discount



Source: EPRA, News N. 25, March 2008.

Figure 2 NAV Premium: France, Netherlands and Belgium (2007)



Source: Global REIT Report-REIT Market Review 2007, Ernst&Young, October 2007.

Irrespective of the precise size of market price deviations from NAV, the circumstance that most REITs – in terms of market capitalization – trade at discount is particularly relevant if combined with the regulatory provision that oblige REITs to refer to NAV for reporting share values and issuing new equity. In fact, in the presence of persistent discounts, the misalignment between (higher) NAVs and (lower) market prices de facto impedes new equity issues due to the mandatory NAV reference. In that sense, we will refer to this limitation as a "market constraint" hereafter. Based upon Figure 1 and

the figures in Table 3, market constraint seems to be a major concern for Italian and British REITs.

Table 2 Average NAV Discount of Italian REITs (2007)

REIT	Average NAV Discount
Fondo Alpha	11.48%
Atlantic 1	28.46%
Berenice-Fondo Uffici	16.54%
Fondo Beta	1.20%
Bnl Portfolio Immobiliare	21.07%
Caravaggio	20.98%
Estense-Grande Distribuzione	17.38%
Immobilium 2001	28.25%
Invest Real Security	28.76%
Investieco	28.26%
Nextra Immobiliare Europa - Caam Europa	38.22%
Nextra Sviluppo Immobiliare – Caam Italia	32.83%
Obelisco	21.73%
Olinda-Fondo Shops	24.14%
Piramide Globale	22.80%
Polis	26.82%
Portfolio Immobiliare Crescita	11.79%
Securfondo	23.63%
Tecla Fondo Uffici	13.68%
Unicredito Immobiliare Uno	30.96%
Valore Immobiliare Globale	26.00%
REIT Average NAV Discount	22,62%
REIT Weighted Average NAV Discount	21,50%

Source: Assogestioni, Report December 2007. Adaptations by the authors, and Italian Stock Exchange.

2.1 The Italian REITs

This paper principally relies on the characteristics of Italian public REITs[11,12]. The REITs are structured as closed-end investment funds externally administered by a so-called management (or investment) company upon

[11] As previously indicated, the analysis does not consider the only recently introduced SIIQ, due to the fact that at the end of 2007, only one SIIQ was quoted. We will refer to Italian real estate investment funds as REITs hereafter. The question of their legal nature has marginal relevance for the issues investigated in this paper. The regulatory set of the present section mainly refers to regulations promulgated by the Bank of Italy (2005).

[12] Public REITs are typically addressed to retail investors. Prudential regulation is relaxed for so called institutional or qualified REITs reserved for professional and institutional investors. For a detailed regulatory description, please refer to Bank of Italy (2005).

mandate of the investors that are participating in the fund[13]. The REIT itself has no board of directors, but the articles of association must provide for a potential general shareholders meeting with authority to change the management company[14]. This provision is intended to mitigate agency costs inherent in the intermediation model and limit opportunistic behaviors of the investment company. Mandatory equity participation of the management company is limited to 2% of the fund's share capital. Notwithstanding the ineffective minimum amount chosen, the rule promotes an alignment of interests between investors and managers.

The investment company's compensation is generally stated as a percentage of the fund's NAV; however, management fees are also frequently based on the gross asset value of the fund[15]. Additionally, performance fees may be charged.

Closed-end refers to the finite life of the investment vehicle (limited to a maximum of 30 years[16]), with REITs being entitled to raise additional equity capital and redeem existing shares[17]. Investors may contribute in cash (as usually the case for public REITs) or real estate assets; particular protection rules apply to asset contributions made by the investment company (or related parties) which manages the fund in order to safeguard the interests of investors from the embedded conflicts of interest.

REITs are subject to investment limitations and asset tests in order to qualify and be authorized as REITs by the supervisory authority. REITs must invest at least 2/3 of their assets in real estate, with no single property representing more than 1/3 of the total assets (the so called "concentration test")[18]. On the liability side, leverage limitations impose a maximum debt-to-real estate ratio of 60%, with the denominator being defined as the MV of the properties assessed by independent appraisers on a semiannual basis[19]. Potential violations of these rules result in compliance risk. We refer to regulatory debt restrictions as "*leverage limitations*".

[13] The investment companies are entitled to manage several REITs.

[14] This provision applies to REITs established from 2003 onwards. Older REITs were not requested to have a shareholders meeting.

[15] At the end of 2007, 12 (55%) of the 22 listed Italian REITs state the management fee as a percentage of NAV; 10 (45%) as a percentage of asset under management.

[16] Duration of most REITs is limited to a 5 to 20 year range. REIT life is stated in the articles of association.

[17] These provisions have to be stated in the articles of association.

[18] Other specific rules and exceptions apply. For regulatory details, please see [Bank of Italy (2005)].

[19] Assuming real estate investments only, the debt-to-equity ratio is therefore equal to 1.5. The leverage ratio, defined as the total asset value divided by the equity value, would amount to 2.5.
Further limitations apply to the debt-to-non real estate asset ratio. REITs may leverage up to 20% of financial assets assessed at fair value [Banca d'Italia (2005)].

Contrary to most European (and US) REIT regimes, Italian real estate investment funds enjoy a favorable tax status without being subject to mandatory payouts. The preferred taxation is provided in order to off-set the severe prudential regulatory burden. REITs are considered pass-through vehicles at an entity level in the sense that income from both current operations and asset dispositions is tax-exempt. At the investor level, distributed dividends and capital gains on REIT shares are subject to a 12.5% withholding tax for individual shareholders, and considered corporate income, and therefore subject to regular tax rates for non-individual shareholders. It is noted that the withholding tax for individual investors is the same for long-term debt and equity investments.

No mandatory payout rules apply at the REIT level; the periodic dividend distribution is therefore determined by the management company in accordance with the articles of association of the REIT which normally impose minimum payout ratios. Anecdotal evidence shows that distributable income generally excludes non-realized gains that are derived from real estate appraisal values, i.e., from positive value differences of properties between a current period and the initial reporting period. Tax rules consequently do not represent a constraint for Italian REITs. However, as shown in the following sections, the tax rules are fiscal constraints in the sense that even if tax treatment does not influence the amount of retained earnings available for investments – as for most other REIT regimes in Europe and the United States – it affects REIT capital structures via the cost of debt. In that sense, we will speak of "*tax controls*".

In order to increase share liquidity and provide shareholders with a market for disposition, listing on the stock exchange within 24 months from the initial public offering is mandatory for retail or public REITs, defined as funds with a share face value below Euro 25,000. Due to their limited average size, trading characteristics and liquidity features, REITs are considered small-cap stocks.

Summary statistics of the Italian REIT market are reported in Table 4 which shows assets under management and net assets of both public and private investment vehicles. At the end of 2007, 109 REITs had been established: 27 (24.8%) were registered as retail REITs, 22 of whom were already listed on the Italian Stock Exchange; and 82 (75.2%) were incorporated as private (institutional) REITs. Overall, assets under management and net assets accounted for Euro 31.4 billion and Euro 19.1 billion, respectively, comprising 87.2% of the total assets invested in real estate. Public REITs managed Euro 10.4 billion of assets (equal to 33% of the industry's total); net assets amounted to Euro 7.4 billion after subtracting a debt of Euro 3.0 billion, equal to a debt-to-equity leverage ratio of 40%; and based on REIT market capitalization, the debt ratio amounted to roughly 50%. Public REITs tend to

be widely held by retail investors and larger in terms of assets under management than private vehicles, most of which are constituted by asset contributions from a few professional or institutional shareholders. At year-end 2007, public REITs had an average size (in terms of assets under management) of Euro 385.2 million compared to the Euro 256.1 million of private REITs. Market prices of public REIT shares were 21.5% below NAV, on average. This circumstance, in conjunction with the regulatory obligation of pricing new equity issues, regardless of market price dynamics, and on the basis of NAV, makes initial public offerings difficult since no potential buyer will pay a NAV-based price when the market price is lower. This requirement limits the financial options available to REIT managers, and therefore, their investment opportunities.

Table 3 Italian REITs

Assets Under Management	**31.4**	100.0%
Public REITs	10.4	33.1%
Private REITs	21	66.9%
Net assets	**19.1**	100.0%
Public REITs	7.4	38.7%
Private REITs	11.7	61.3%
N° of REITs	**109**	100.0%
Public REITs	27	24.8%
Private REITs	82	75.2%

Note: Values in billion Euros and percentage.
Source: Assogestioni, Report December, 2008.

3. Capital Structure and Legal and Market Constraints

Financial sources are represented by debt, equity, and retained earnings. The optimal combination of those sources, both at an absolute and a relative level, has been widely investigated in the economic literature, mainly as a function of tax levies and bankruptcy costs, on the one hand, and of agency costs and adverse selection problems, on the other hand. The first variable set basically refers to the classic capital and tradeoff theory, the second body of factors is addressed by agency and pecking order literature. Other theories may apply as well. The results are still controversial and from our point of view, not yet conclusive when discussing the capital structures of firms and in particular, REITs. The following outline therefore simply attempts to define a general body of financial theories that may be useful for interpreting at a conceptual stage how the three above mentioned major legal and market constraints – (1) leverage limitations, (2) market price discounts on NAVs, and (3) tax controls – affect REIT capital structures, and consequently REIT share values. However, our key point is that in doing so, we need to perform a separate analysis of the effects that the constraints produce on *market value* and *NAV*

of REIT shares. This is due to the fact that the two values reflect alternative valuation approaches (a financial methodology and a static, asset-based approach, respectively), which perceive capital structure decisions that are induced by the above mentioned constraints, differently. Should market prices and NAVs react differently, NAV discounts (or premiums) would consequently be affected[20].

We first investigate the effects of tax controls on REIT capital structures from a general perspective (Section 3.1.). We then consider how the market constraint limits the effective financial options to debt (Section 3.2.1.). We finally highlight how the regulatory leverage limitations lead to sub-optimal financial structures with respect to a constrained-free environment (Section 3.2.2.) and how non-optimal solutions generate different effects on market prices (financial approach) and NAVs (asset-based approach). The two valuation perspectives are integrated in Section 3.3.

3.1 Tax Controls

The financial theory suggests that there is a tradeoff between the benefits and the costs of debt [Zeng et al. (2007)], where debt competes with equity in allocating the operating income of a firm. Advantages derive from tax savings due to fiscal deductibility of interest payments, while risk shifting towards lenders, exposes the firm to bankruptcy and related costs.Balancing the two contrasting factors enables the identification of a target capital structure, at least over the long run.

In particular, under the extreme assumption of the absence of explicit or latent bankruptcy costs and the presence of taxes at the corporate level, the investment vehicle should maximize debt in order to fully exploit tax shelters [Modigliani, Miller (1963)].

In the opposite hypothesis of a tax-free corporate environment (i.e., taking into account the first of the above-mentioned REIT constraints defined as “tax-controls”) while allowing for financial distress and inherent costs, debt has no significant advantage over equity. This is clearly the case of REITs that are generally classified as tax-free entities and potentially exposed to insolvency risk from leverage. In the presence of non-trivial bankruptcy costs, and also in consideration of negative fiduciary externalities associated with the collapse of highly regulated investment entities such as REITs, equity should therefore generally be preferred to debt, at least over the long run and for raising debt levels that significantly increase the probability of default [Howe, Shilling (1988)]. In particular, higher debt ratios should gradually lead to higher costs that are not off-set by debt benefits. Thus, high and rising debt levels negatively impact share value, ceteris paribus.

[20] Most of these considerations apply to public retail REITs while only applicable to private vehicles under specific, stated circumstances.

However, should the default probability be considered low, even for relative high debt ratios due to the collateral value of the firm's assets [Titman, Wessels (1988)] – as might be the case for REIT investment in real estate – financial distress may play a minor role. In this case, capital structure would move toward the classical model in which financial leverage has no effect on the REIT cost of capital and thus on the value of the REIT [Modigliani, Miller (1958)]. This case is particularly relevant if there is no difference in tax brackets between debt and equity investments for retail and individual investors to whom public REITs are marketed. This describes the Italian case, with both asset classes levied at the same rate of 12.5%. This parity allows simplification of the relative advantages of debt and equity at both the entity and investor levels [Myers (1984)].

Empirical evidence is, however, contrary to the prediction of low levels of debt induced by the tax exemption's disincentive for leverage: 2007 market data of public Italian REITs show an average debt level, measured as debt-to-equity ratio, of almost 50% (see Section 2). In addition, as described next in more detail, leverage tends to increase over time for almost all REITs. The reasons for this circumstance are controversial and require consideration of other factors, such as asymmetric information and agency costs which could explain REIT leverage, even in a tax-free context, and positive REIT stock price reactions to debt offerings [Howe, Shilling (1988)].

The presence of debt might be explained by asymmetric information between firm managers and their equity investors within an agency relationship [Myers, Majluf (1984)]. In particular, leverage – especially in the form of standard debt [Diamond (1983)] – provides incentives to managers to select investment projects that will enable the firm to meet debt service and dividend payment obligations, which reduce cash-flow available for other projects that are not in the best interests of their shareholders. Similarly, high dividend payouts also serve to reduce agency costs by limiting the financial freedom of managers [Bradley et al. (1998)]. An alignment of interests between shareholders and managers may also be favored, under certain conditions, by a non-trivial equity capital participation of the REIT directors which limit their incentives for opportunistic behaviors because they would prejudice their own interests [Friday et al. (1999)].

If the agency theory applies, debt could contribute – at least for certain, limited amounts – to the disciplining of managers to meet shareholder interests and reduce monitoring costs. Under this hypothesis, leverage should not necessarily lead to lower valuations. Also, the tangible nature of real estate assets,which have active second-hand and well functioning markets [Myers, 1984], could allow for relative low-risk, secured debt. This may permit managers to rationalize a moderate level of borrowing [Titman, Wessels (1988)].

From a financial perspective, the experience of Italian REITs seems consistent with this view of leverage because of agency costs, conflicts of interests intrinsic to the externally managed, closed-end investment vehicle, and the limited amount of equity required by regulation to be invested by the management company. In addition, public REITs are typically addressed to widely dispersed and non-professional retail investors; the monitoring and performance evaluation of directors are therefore weak and largely rely on broad reputational and market discipline [Friday et al. (1999)].

The pecking order theory is also related to asymmetric and privileged information [Myers (1984)]. Myers and Majluf (1984) suggest an ordinal preference of financial sources for managers. They suggest that managers prefer retained earnings, issue debt as second best, and issue equity only as a last resort as a function of the relative value perception of securities by external investors with respect to manager information. However, the pecking order theory as well as the choice between debt and equity requires access to all financing sources (retained earnings, debt and equity). Given the regulatory and market constraints on Italian REITs, this condition is not relevant. In fact, in a controlled context, debt recourse could simply reflect a lack of financial alternatives.

3.2 Regulatory and Market Constraints

We argue that the assertion that leverage could simply express the lack of financial choices is derived from a combined interaction of leverage limitations, the evidence of REIT shares traded at discount on NAVs, and the imposition of NAV as a mandatory valuation standard. As described next, this combination narrows funding options available to managers by generating a suboptimal financial context with respect to a constraint-free environment. Our explanatory hypothesis also assumes that: (1) REITs usually have no positive net present value (NPV) opportunities available on a long-term basis. While there may be positive NPV investments available from time to time, given the relative market depth for institutional core real estate, zero-NPV opportunities should be the normal case, (2) REITs do not change their investment policy in terms of operational risk. REIT directors are, in fact, tied to the investment risk profile stated in the articles of association, (3) REITs raise debt after having invested all initial equity capital. In fact, as described in Section 2, most public Italian REITs are established via cash contributions. In the initial stage, they are therefore pure equity REITs with no debt. The collected equity is used to acquire real estate assets. REITs start to leverage only after having invested this initial equity in order to capture new investment opportunities. As depicted, the debt-to-(real estate) asset ratio is capped at 60%, and finally, (4) debt is basically represented by “bullet financing”, in which the borrower (the REIT) makes only annual interest payments, but no principal reimbursements until the single-maturity date of the loan.

3.2.1 Market Constraint

As previously outlined, Italian REITs trade at deep discount from NAVs. This fact would not be a particularly relevant matter if REITs were free to endogenously determine the price for new equity issues based upon market conditions. However, as already depicted, Italian REITs are forced to refer to NAVs when issuing new shares. If REIT shares trade at discount, this circumstance makes the issuance of new equity unfeasible due to the fact that share buyers are not willing to pay the (higher) NAV price, and prefer to buy the shares in the secondary market (at lower prices).

This circumstance limits the financial options available to REIT managers to retained earnings and debt. This limitation also makes it highly questionable that directors select these funding sources based on the pecking order theory.

3.2.2 Regulatory Constraint

Italian REITs, consistent with the international experience, generally have a policy of high dividend payouts determined in the articles of association, so accrued earnings also represent a limited financial source[21]. In addition, retained earnings are usually insufficient to finance new real estate investments due to the high values of most real properties, at least for Italian REITs. The REIT articles of association usually do not allow distribution of unrealized capital gains that are derived from periodic revaluation of properties. These unrealized profits significantly reduce available cash-flow to a level below net income and greatly exceed the contrary non-monetary depreciation expense effect [Bradley et al. (1998)]. In addition, should REIT managers deliberate at their discretion (as actually allowed by the articles of association of some REITs) variations in earning retention policies, this would have potential agency cost implications. Investors would have difficulties in accurately attributing deviations in cash-flows to the actions of the managers or factors beyond the control of the managers [Bradley et al. (1998)].

Debt seems therefore to be the only relevant funding option available to REIT managers to raise additional external capital to finance new investment opportunities.

How does debt affect capital structures, and therefore, share values, considering the lack of financial alternatives (i.e., equity, and for the large part, retained earnings) combined with the overall regulatory set (i.e., leverage limitations and NAV valuation standards)?

[21] 16 (73%) of the listed REITs foresaw in their articles of association, payouts with percentages usually in a range between 70% and 90% or determined by the management company (2007) while 6 (27%) did not [Assogestioni (2008)]. Note, however, that the management company is always entitled to suspend the dividend distribution in the interest of the shareholders.

Our hypothesis is that the effects are ambiguous, given the valuation approach followed – financial versus NAV.

(i) Financial Approach

In consideration of the financial methodologies, we have at least two alternative explanatory effects.

If the classical trade-off theory applies, any significant debt level would have no positive effect on the REIT value in a tax-free context [Maris, Elayan (1990)] nor would it eventually negatively influence share value in consideration of the probability of financial distress associated with leveraging. The theory assumes the circumstance of zero-NPV investments. However, in consideration of the nature of REIT assets (which can easily be used as collateral), agency relations and bankruptcy costs, REITs may be expected to issue debt [Titman, Wessels (1988)], at least for certain amounts, and seek a balance between management incentive and distress costs. The reasoning is that after having invested all initial equity, a REIT faces new investment opportunities (assumed to have zero-NPV and an expected internal rate of return (IRR) equal to that already being achieved by the assets in place) under equity capital rationing (because of the "market" constraint)[22]. Should the REIT use debt funds, and if so, up to what amount? Given the collateral value of real estate, the REIT could probably issue low-risk debt obligations up to a certain level without significantly altering its expected probability of default. In addition, a certain debt level may also provide the discipline for REIT directors to effectively and efficiently manage, thus positively influencing net cash-flows. Relatively low levels of debt are therefore expected to potentially lower the weighted average cost of capital (WACC) over the short run and therefore, increase the value of the REIT as compared to a suboptimal (all-equity) capital structure. Beyond some threshold level of debt, the positive effects are counteracted by the potential costs of financial distress that rise as the level of debt increases. We can expect REITs, therefore, to be able to identify, at least over the long run, a desired capital structure with leverage ratios that minimize WACC and maximize asset and share value.

This is a relevant differentiating point with respect to the asset-by-asset NAV valuation methodology that is discussed next. In a capital structure formed under the financial valuation methodology, an optimum debt level exists, at least theoretically; also, it eventually fluctuates over time due to short-term adjustments [Myers (1984)]). When the optimal leverage level is reached, the REIT should pass up new investment opportunities because a sub-optimal WACC would tend to lower share values.

[22] Remember that most Italian REITs are established via cash-contributions as "all-equity" REITs.

When debt limitations exist, as for REITs, two situations of interest may arise with respect to the effects of regulatory and market constraints on capital structures and share values from a financial perspective.

(1) The optimal debt (D) to asset (A) ratio may be lower than permitted by regulation [$D/A_{OPT} < D/A_{REG}$]. In this case, the REIT would stop investments and leverage before reaching the maximum allowed debt-to-asset ratio. This result occurs because the regulatory debt-to asset ratio is suboptimal in financial terms with respect to the capital structure that is endogenously defined. However, the REIT would be limited in its investment capacity compared to a constraint-free environment. This is due to its inability to issue new shares in order to maintain the desired optimal capital structure. This inability is determined by the mandatory NAV reference values for equity offerings, combined with the severe market price discount on NAVs.

(2) The optimal debt-to-asset ratio may be higher than the regulatory maximum level [$D/A_{OPT} > D/A_{REG}$][23].The legal constraint prevents the REIT from achieving the most favorable capital structure, which implies a higher WACC than the firm value maximizing capital structure. In turn, this generates a negative price effect on share values with respect to the predictable (higher) market price induced by the optimal leverage ratio of the REIT.

Regulatory leverage limitations would in that case be detrimental to the (retail) investors who are presumably protected by the same prudential regulation. This paradoxical situation would not be an Italian peculiarity, but applicable to most European REIT regimes that have analogous leverage limitations (see Table 1).

(ii) NAV Approach

In the NAV approach, a REIT share value consists of the value of the property portfolio, based on the appraised MV of the underlying real estate assets, minus the liabilities of the company usually considered at a nominal value, divided by the number of issued shares [Veld, Hughes, 2008]. Debt affects NAV share values in a substantially different way than it does from a financial perspective. We argue that this is a key point and has severe implications.

The reasoning is as follows. Suppose that we have an all equity REIT already fully invested in real estate facing (at the beginning of the year) new investment opportunities to be financed with debt. In the first stage, zero-NPV investment opportunities should have no effect on NAV because of the same value added to both sides of the REIT balance sheet. That is, the same value

[23] A debt-to-asset value of around 60% (equal to a loan-to-value ratio [LTV] of the same amount), as chosen by many European REIT regulations (see Appendix 1) might not be abnormally risky because of the usually core institutional real estate quality of public REIT assets.

of the asset (i.e., the MV of the acquired property that is assumed to be equivalent to the acquisition price [P] due to the zero-NPV of the investment project) also appears on the liability side (i.e., the nominal debt value issued for financing the P). So, the investment project does not immediately alter the NAV of the REIT, but modifies the debt-to-asset or equivalently, the debt-to-equity ratio. However, the investment opportunity is expected to contribute to the profit of the REIT by increasing (marginal) earnings by an amount equal to the expected positive difference between the total operating return [r_{OP}]) of the property and the cost of debt [r_D][24]. In turn, this leads to an increase in NAV at the end of the year, with all other things being equal, because of the positive accounting income effect of the zero-NPV investment opportunity.

Additional debt-financed investment projects with analogous expected NPVs and IRRs as the assets are already in place would continue to increase the NAV of the REIT from an accounting perspective. Their marginal contributions are expected to be always positive, also at decreasing rates, but entice managers to take advantage of every available investment opportunity. Of course, this investment trend implies increasing leverage ratios, and in turn, higher marginal interest rates (assuming that creditors are aware of the rising risk), increasing debt, and its cost up to the abstract point where the cost of debt equals the operating return of the property. At the balance sheet level, this situation would theoretically occur at the point where the NAV of the REIT is equal to zero.

Earnings distributions would subsequently reduce NAV by the amount dispensed; the retained portion increases net assets and prolongs the finite debt-financed investment process by marginally increasing the financial

[24] Note that the single, marginal real estate acquisition is 100% debt financed (debt-to-asset ratio equals 1). However, at the portfolio level of a REIT, the debt-to-asset ratio is lower than 1 due to the initial equity collection (i.e., in the initial stage, the REIT is "all-equity").
For low levels of leverage, the cost of debt might be lower than the expected return on the property because the lender counts on recourse to the financed asset's collateral intrinsic value and/or on borrower's other assets.
To illustrate the process, suppose that there is an all-equity REIT with initial equity (E) = 10,000, real estate assets (A) = 10,000, and debt (D) = 0. So, $NAV_0 = A - D = 10{,}000$. For simplicity, we do not consider the net income of period 0, which would be equal to the return on the investments (ROI) already in place in the absence of debt and taxation. The REIT faces a new zero-NPV investment opportunity immediately after t_0 (*i.e.*, at the beginning of year 1). The MV or alternatively, the P of the new investment opportunity is 5,000 with $r_{op} = .1$, equal to the r_{op} of the assets already in place. The requested interest rate (r_d) = .07 (7%), that is $r_{op} > r_d$. This is because at the REIT level, NAV > 0 or, alternatively, D/A < 1. MV is assumed constant over time. The payout ratio for period 1 = 0.
Immediately after acquisition, NAV will not change: A = 15,000, D = 5,000 and NAV_0 = 10,000. In the absence of taxation, the marginal net income contribution (ΔNI_{MARG}) of the new investment at t_1 (end of year 1) will be $\Delta NI_{MARG} = (r_{op} - r_d) \times MV = (0.1 - 0.07) \times 5{,}000 = 150$. So $NAV_1 = 10{,}000 + 150 + 1{,}000$ (→ ROI of $A_0 = 10{,}000$).

capability of the REIT. A 100% earnings distribution is unusual, so NAV would be expected to increase.

Thus, the relation between leverage and expected investment returns is always positive in a NAV-appraised share value regime.

The maximum leverage ratio predicted by the NAV criterion should always be higher than that predicted by the financial criterion. Under the financial criterion, debt has no effect, or a negative effect, on a REIT share price (trade-off theory), or positively contributes to a lower WACC only up to the point where the manager incentive and agency costs discourage further debt-financed investment.

3.3 The Effects of Constraints on Capital Structure and REIT Share Prices: Integrating the Two Valuation Perspectives

A key concept to note from the analysis heretofore is that the NAV and financial share valuation methodologies significantly differ with respect to how leverage and implied capital structures are perceived.

NAV is unaffected by the debt ratio in the sense that the REIT share value is simply the residual, nominal difference between asset values and debt, regardless of the effective capital structure in place. Leverage comes into play only when the cost of debt equals or exceeds the property returns. In the presence of regulatory leverage limitations, the NAV valuation approach always provides an incentive for REIT managers to increase debt up to the maximum amount allowed[25,26]. In other words, the asset-based valuation perspective is basically a property level methodology that simply focuses on the MV of the properties held by the REIT and deducts the *nominal* debt from the overall real estate portfolio valuation in order to obtain the *NAV* of the REIT.
This is clearly not the case from a financial valuation perspective which is a firm-level valuation method. Capital structure influences share value via a financial risk perception and not – as in the NAV valuation perspective – in

[25] Should appraisers use the discounted cash flow (DCF) methodology and not the sales comparison approach to estimate the MV of properties, then, NAV would in theory be financial in nature as well, but only at the property level valuation. In fact, appraisers use average real estate industry data (where financial risk is not in the MV of the appraised asset), while financial analysts employ firm specific data that reflect the financial risk embedded in the effective capital structure of the single REIT. So, the valuation level and perspective considerably differ.
[26] The analysis does not consider compliance risk. It arises in the case of market turnarounds that reduce real estate asset values below regulatory leverage limitations. Should current net cash-flows be insufficient to allow adequate debt reimbursements in order to meet the regulatory leverage ratio, REITs could be forced to liquidate properties in critical times in order to lower the debt-to-asset ratio below the maximum allowed level to avoid regulatory sanctions.

pure nominal terms. However, the sign and magnitude of the debt effect might vary as a function of the financial theory that best describes REIT behavior. In the short run, leverage ratios could be positively or mildly positively related to share market prices. This relationship is consistent with the adverse selection cost of equity and pecking order theory which stresses the fact that – even in a tax free context – cash flow limitation may have a positive effect on share value. Should the trade-off theory apply, the correlation between debt and share market prices should always be negative. Alternatively, the classical theory suggests no effect of debt.

If the NAV of the REIT and market prices are affected differently by leverage, this circumstance should also be reflected in market price discounts on NAVs.

We attempt to empirically verify this hypothesis. Our perception is that REIT managers follow a NAV maximization approach. This observation is supported by at least two considerations. First, the overall regulatory framework identifies NAV as the guiding reference value for reporting and supervisory purposes. In particular, return performances are usually calculated on NAV in, for example, annual and semi-annual reports. Second, compensation structures of REIT managers are often based on NAVs; directors therefore tend to place more emphasis on NAVs than current share prices[27].

4. Market Data and Empirical Analysis

The above mentioned hypotheses are empirically tested. The investigation is based on Italian public REIT data that involve daily market prices and semi-annual NAV figures for the entire (22) public REIT population. The observed time window varies for each REIT as a function of the listing date on the Italian Stock Exchange and ends on December 31, 2007. The first observation is on November 29, 1999. The number of observations for each REIT time series is reported in Table 5.

The most important sources of data for this study are the Italian Stock

[27] These considerations basically only hold for public REITs for which market prices are available; private REITs are affected by such considerations only when shareholders follow a NAV valuation approach or should they follow a financial perspective, in the case that the preferred leverage ratio chosen in a constraint-free environment is higher than the maximum regulatory level and the trade-off theory does not apply. In the second case, private REITs would be forced to issue new shares in order to comply with prudential regulation; equity offerings, however, would generate a sub-optimal capital structure from a financial point of view. The share value of the REIT would therefore be lower than in the case of a constraint-free context in which REIT managers would be allowed to choose the preferred debt level and payout ratio, and consequently, the optimal capital structure.

Exchange and the Italian Mutual Funds & Investment Firms Association (Assogestioni).

Table 4

REIT	Listing Date	Market Price Observations
Fondo Alpha	07/04/2002	1395
Atlantic 1	03/07/2006	379
Berenice-Fondo Uffici	07/19/2005	506
Fondo Beta	10/24/2005	555
Bnl Portfolio Immobiliare	01/02/2002	1523
Caravaggio	05/16/2005	669
Estense-Grande Distribuzione	08/03/2004	869
Immobilium 2001	10/29/2003	1061
Invest Real Security	01/24/2005	747
Investieco	11/01/2004	805
Nextra Immobiliare Europa (*Caam Europa*)	11/17/2003	1048
Nextra Sviluppo Immobiliare (*Caam Italia*)	06/03/2002	1398
Obelisco	06/14/2006	392
Olinda-Fondo Shops	12/09/2004	762
Piramide Globale	11/26/2002	1293
Polis	04/20/2001	1700
Portfolio Immobiliare Crescita	07/01/2003	1146
Securfondo	02/05/2001	1251
Tecla Fondo Uffici	03/04/2004	892
Unicredito Immobiliare Uno	06/04/2001	1669
Europa Immobiliare 1	14/12/2006	270
Valore Immobiliare Globale	11/29/1999	2052

Source: Assogestioni, Report December 2007

In constructing the data set, information is collected from different data banks. In some cases, we were forced to estimate the daily values lacking (e.g., leverage measured as debt-to-asset ratio and NAV figures) by linear interpolation. Moreover, the hypothesized explicative variable (debt-to-asset ratio) is normalized with respect to the maximum regulatory level admitted in order to have the same variation interval with respect to the NAV discount and to best perform a cluster analysis. Similarly, in a consistent manner, *beta*-regression coefficients are normalized with respect to the highest coefficient[28].

We first estimated the debt trend for all public REITs in order to test whether leverage follows the (NAV) predicted pattern of increasing debt ratios over

[28] The debt-to-asset ratio is normalized in a range between 0 and 1; *beta*-coefficients are normalized in a range between -1 and 1.

time. Based on the theoretical framework outlined in the first part of the paper, we expected debt levels to increase over the REIT maturity, which is consistent with the NAV valuation standard. The debt trend was estimated with an analytical approach[29]; this methodology is the only feasible one due to the limited time period of the available NAV and debt data (semi-annual reporting period) that does not allow for the calculation of moving averages.

Second, we focused on the correlation between the debt-to-asset ratio (consistently with the regulatory provision) and the market price discounts from reported NAVs by time series linear regressions. In particular, we used the following (simple) linear regression model:

$$NAVDISC_t = \alpha + \beta\, DEBT_t + \varepsilon_t \qquad (1)$$

in which the NAV discount (hereafter, NAVDISC) is regressed on a constant and debt-to-asset ratio.

In the model, the term ε_t is a usual normally distributed error with a zero mean and variance σ^2_{ε}. The error term is very important in order to consider the influence on the dependent variable of other regressors that we omitted in this context because not relevant for our purpose[30].

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[29] The analytical approach estimates the trend of a variable by identifying particular values T_t that can be substituted for the original values registered by the variable observed at different times. Let X be the variable of which we want to estimate the trend and let x_t be the values that X assumes at time t (t =1,...,N); hence, we obtain the values T_t as follows: $T_t = a' + b't'$,
where: - a' is the average of the time-series values x_t;
- b' is obtained by dividing N ($\Sigma_{i=1:N}\ t' \times x_t$) by N (N^2-1) and
- $t' = t - (N+1)/2$.

[30] In fact, this analysis does not investigate NAV discount determinants per se. However, if leverage influences market prices and NAV figures in a different way, debt may partially explain for the discounts. In any case, the fact that other variables could explain NAV discounts is revealed by term ε_t in the regression model. As commonly known, the first part of the previous equation, such as $\alpha+\beta DEBT_t$, which represents the regression function, explains the average relation that exists between *NAVDISC* and *DEBT* during the time. So, if we know the value of *DEBT*, by using this regression function, we could forecast a value $\alpha+\beta DEBT_t$ for the dependent variable *NAVDISC*. The error term ε_t instead incorporates all factors that explain the difference between the average value of *NAVDISC* at time t and the value forecasted by the regression function. In particular, this error contains all other factors, which are different from *DEBT*, that cause the value of the dependent variable for a specific time t. As a consequence, the value of R^2 obtained by using the regression errors, can also be considered as a measure of the omission of relevant dependent variables in the model (Stock et. al, 2003).
For an analysis of other explanatory variables of the Italian REIT NAV discount, please refer to (Biasin et al., 2010). The analysis confirms the explicative potential of debt.

For each analyzed REIT, NAVDISC was calculated by using the following formula:

$$NAVDISC_t = \frac{(NAV_t - P_t)}{NAV_t} \quad (2)$$

where NAV_t = NAV of each share of the *ith* REIT at time *t*;
P_t = market price[31] of the *ith* REIT at time *t*.

Since the investment assets of Italian REITs are appraised semi-annually by independent professional appraisers, we needed to provide acceptable proxies for the true daily NAV. To estimate the daily NAVs, we assumed a linear trend for each of the six-month period considered.

Moreover, in order to confirm the indications of the empirical results obtained via time-series regressions, we performed a panel fixed-effects estimation on the parameters of Equation (1).

The basic idea is that the market price discounts on NAVs reflect leverage effects in recognition of the different perceptions of debt reflected by market prices and NAVs. In contrast to market prices, NAVs do not directly reflect financial risks embodied in capital structures.

The type of analysis performed did not allow us to specify the sign and intensity of the variation of the two components of NAV discounts (NAV and market price) with respect to leverage increases. We therefore used repeated regressions, testing for the correlation of the debt-to-asset ratio with NAV and market price independently.

Also, in these cases, we used a simple time series linear regression model in which the dependent variable – NAV or alternatively, market price – is regressed on a constant and debt-to-asset ratio. So, we respectively considered the following two models:

$$NAV_t = \alpha + \beta\, DEBT_t + \varepsilon_t \quad (3)$$

and

$$P_t = \alpha + \beta\ DEBT_t + \varepsilon_t \quad (4)$$

Based on the theoretical framework outlined in the first part of the paper, we expected leverage to be positively related to NAV due to the nature of the NAV valuation methodology. From a financial perspective, the effects of debt on REIT market prices are more uncertain. Should the classical capital structure theory best describe REIT financial behavior, debt could have no noticeable effect on market prices. However, if bankruptcy costs come into

[31] The market price is the "official price", that is, the quantity weighted average price of the entire quantity traded in the session, excluding contracts executed with the cross-order function. [London / Italian Stock Exchange (2007)].

play, the trade-off theory suggests, at least for increasing debt levels, a negative correlation. Consistent with manager incentives for increasing debt levels and with asymmetric information, leverage could be positively related to market price even in a tax-free context, at least in the short run. As before, in such cases, we run a panel fixed-effects estimation in order to confirm the results obtained via regressions.

In the third stage, we conducted a cluster analysis[32],using a nonhierarchical method in order to: (1) test whether older REITs, which are presumed to have higher debt ratios, are characterized by higher NAV discounts in relation to debt, and (2) control for other components that could influence REIT financial behavior. In particular, we controlled for the REIT manager fee structure and residual lifetime.

Compensations based on total assets, as opposed to NAVs, should lead to higher leverage ratios because of the incentive to increase assets, even in negative NPV investments. However, the correlation intensity between debt-to-asset-ratios and market price discounts on NAVs could be mitigated by the decreasing residual lifetimes of closed-end REITs. This mitigation would occur under the assumption that NAVs and market share prices tend to move closer as the REITs approach maturity.

4.1 Empirical Results

The analysis showed a positive trend of leverage (measured as debt-to-asset ratio) for almost all REITs[33]. This evidence seems to support the debt maximization incentive induced by the combined effect of "market" and "leverage" (or "regulatory") constraints. These constraints are effective because of the lack of alternative financial choices, the mandatory NAV reference value, and leverage limitations. Moreover, debt ratios are positively related to market price discounts on NAVs.

A regression analysis demonstrated that leverage is significantly associated with the NAV discount during the time. In particular, the regression coefficients shown in Table 6 are positive for almost all REITs and the

[32] Data transformation and normalization are strongly recommended in the analysis of clusters because this ensures that the result is independent from the unit used to measure the variables. In addition, normalization ensures that all the variables contribute to the classification to the same extent.
In the implementation phase, we used a nonhierarchical method. In particular, we used the fundamental k-means algorithm, i.e., the renowned mobile center criteria. During the implementation which used SPSS, we achieved the best results by using simple Euclidean distance as a proximity measure, and decided to fix the maximum number of iterations and the convergence criterion to 200 and 0, respectively.

[33] Two REITs (Securfondo, Atlantic 1) present a slightly negative trend. These values may reflect the analytical approach followed. Debt trend details are available upon request.

(adjusted) R-Square is always higher than 0.41. For all REITs, the coefficient of the independent variable is significantly different from zero at the confidence level of 95%, as confirmed by the *t*-test, and the data are well fitted during the time, as shown with the same probability by the *F*-test[34].

The presence of term ε_t allows the specific relevance of leverage to be consistently delineated on the previous note that the discount is a function of a set of variables.

Table 5 NAV Discount Regression Coefficients

	beta NAVDISC norm	**R^2**
ATLANTIC 1	-0.197417335	0.776
BERENICE-FONDO UFFICI	-0.111328507	0.989
BNL PORTFOLIO IMMOBILIARE	-0.111328507	0.596
CARAVAGGIO	0.048522794	0.45
ESTENSE-GRANDE DISTRIBUZIONE	0.048522794	0.815
EUROPA IMMOBILIARE N°1	0.069653688	0.913
FONDO ALPHA	0.184504011	0.949
FONDO BETA	-0.05204461	0.954
IMMOBILIUM 2001	0.414595969	0.41
INVEST REAL SECURITY	0.122480923	0.698
INVESTIECO	1	0.556
NEXTRA IMMOBILIARE EUROPA	0.184112698	0.518
NEXTRA SVILUPPO IMMOBILIARE	0.187243201	0.955
OBELISCO	0.074153786	0.982
OLINDA-FONDO SHOPS	0.0624144	0.952
PIRAMIDE GLOBALE	0.418704754	0.666
POLIS	0.395030327	0.415
PORTFOLIO IMMOBILIARE CRESCITA	0.106045784	0.601
SECURFONDO	0.355899041	0.869
TECLA FONDO UFFICI	0.063392682	0.899
UNICREDITO IMMOBILIARE UNO	0.732537664	0.591
VALORE IMMOBILIARE GLOBALE	0.154177265	0.601

In order to confirm the previous results, we also run a panel fixed effects[35] regression on the following model using a panel data set that refers to 21[36] REITs and 379 days[37] from July 2006 to December 2007[38]

[34] Data are available upon request.

[35] We used a fixed effect estimator for the following reasons.First of all,we have a closed and exhaustive sample of information.In this situation,fixed effects are the natural candidates.Secondly,this estimator has the advantage of effectively capturing

$$NAVDISC_{it} = \alpha + \beta\, DEBT_{it} + \varepsilon_{it} \quad (5)$$

where the error term is equal to a REIT fixed effect plus a truly idiosyncratic term $\varepsilon_{it} = \mu_i + w_{it.}$

The fixed effect μ_i absorbs all variables that are fixed in time plus any other fixed in time factors that may be relevant and which we have not explicitly considered.We expected the NAVDISC to be positively associated with DEBT.

Results were obtained with STATA 9.2 and are provided in Table 7.

It can be noted in Table 7 that the fixed effect estimator gives the best results with respect to the random effect (as also confirmed by a Hausman test) or the OLS pooled estimator.

The evidence that NAV discounts increase with rising debt levels is consistent with our expectation that NAVs and market prices would react differently to leverage.

In particular, the separate regressions on NAVs and market prices show that NAVs positively react to higher debt-to-asset ratios in a significant way, while market prices are unaffected by leverage, in the sense that the regression model of the latter does not show a statistically significant correlation (see Table 8)[39]. It appears, therefore, that increasing discounts of market prices on NAVs for rising debt levels are led by positive NAV modifications, and not by decreasing share prices in the market that tend to be independent from leverage.

(or controlling for) all relevant variables that are idiosyncratic to the statistical units that are fixed in time (Baltagi, 2005). The data exhibited enough variation in the temporal dimension to employ a "within" estimator. Moreover, the least squares with dummy variable (LSDV), that is the estimation method in a fixed effects context, is BLUE(*i.e.*,the best linear unbiased estimator) if the model is really $y_{it} = a + bx_{it} + \Sigma_{j=1,\,N-1}\, \mu_j D_{ji} + \varepsilon_{it}$, if x is weakly exogenous and if $\varepsilon_{it} \sim \mathrm{IID}(0, \sigma^2_{\varepsilon})$ and it is in any case, consistent, even if the real model is a random effect model.
We did not use the recent Driscoll and Kraay procedure [Driscoll (1998)] because our testing shows that spatial dependence is very low; so we do not need a more correct estimate evaluation of the standard errors.

[36] A public REIT (Europa Immobiliare 1) has been excluded from the analysis due to its very short listing time (December 2006).

[37] We refer to this time window because it represents the complete common period of REIT life starting from the listing day.

[38] Hence, we worked with 7959 observations to estimate the regression parameters of this model.

[39] For all REITs, the variable coefficient in the regression of NAV on DEBT is significantly different from zero at the confidence level of 95%, as confirmed by the *t*-test, and the data are well fitted during the time, as shown with the same probability by he *F*-test.

Table 6 Results Obtained by a Fixed Effect Estimator Applied to the Panel Data. Dependent Variable: NAVDISC

Regressors	Parameter (Standard Error)
LEV	0.095* (0.0098)
CONSTANT	0.29* (0.004)
* = each parameter is significative at 5% referring to a bilateral test Number of observations = 7959 Number of groups = 21 Observations for each group = 379 $R^2 = 0.39$ Corr(u_i xb) = 0.59 F(1,7937) =94.05 ; Prob>F = 0.000	sigma_u = 0.08412 sigma_e = 0.07039 rho= 0.5881(fraction of variance due to u_i) F test that all $u_i = 0$; F(20,7937) = 520.50; Prob > F = 0.000

To support these results, we also run two (separate) panel fixed effects regressions on the following models by using the same previous panel data set:

$$NAV_{it} = \alpha + \beta\, DEBT_{it} + \varepsilon_{it} \quad (6)$$

and

$$P_{it} = \alpha + \beta\, DEBT_{it} + \varepsilon_{it} \quad (7)$$

We expected the NAV to be positively associated with DEBT while market price tends to be independent from DEBT. Results were obtained with STATA 9.2 and are provided in Tables 9 and 10.

Also, in these cases, as we can note in Tables 9 and 10, the fixed effect estimator gives the best results with respect to the random effect (as also confirmed by a Hausman test) or the OLS pooled estimator.

The results also support our perception that REIT managers follow a NAV approach which creates incentives for managers to increase leverage, which in turn, increases NAV.

From a financial perspective, notwithstanding the limited statistical significance of the regression, the results predict an irrelevance of debt with respect to market prices. These results appear to be consistent with the classical capital structure theory in which leverage does not affect firm value in a tax-free context. However, the results are unclear and need further investigation.

Table 7 NAV and Market Price Regression Coefficients

	beta NAV Norm	R^2	beta Market Price Norm	R^2
ATLANTIC 1	0.017933428	0.99	-0.075385351	0.121
BERENICE-FONDO UFFICI	0.018355296	0.997	-1.284602703	0.67
BNL PORTFOLIO IMMOBILIARE	0.094748157	0.86	0.084383127	0.33
CARAVAGGIO	0.088738775	0.83	0.01302565	0.027
ESTENSE-GRANDE DISTRIBUZIONE	0.209383865	0.68	-0.044722205	0.13
EUROPA IMMOBILIARE N°1	0.094422491	0.978	-0.345656989	0.4
FONDO ALPHA	0.324879921	0.95	0.569154522	0.083
FONDO BETA	0.066033533	0.559	0.067856833	0.31
IMMOBILIUM 2001	0.808357393	0.45	0.335097509	0.061
INVEST REAL SECURITY	0.114981674	0.639	-0.057613317	0.094
INVESTIECO	1	0.55	-0.091812807	0.007
NEXTRA IMMOBILIARE EUROPA	0.138653954	0.546	0.052297345	0.07
NEXTRA SVILUPPO IMMOBILIARE	0.182314649	0.95	-0.013906139	0.01
OBELISCO	0.102307022	0.99	-0.566395833	0.13
OLINDA-FONDO SHOPS	0.016600315	0.99	0.25183331	0.286
PIRAMIDE GLOBALE	0.438937402	0.7	-0.09622298	0.07
POLIS	0.519892425	0.127	0.229224311	0.032
PORTFOLIO IMMOBILIARE CRESCITA	0.201234314	0.858	0.61652379	0.61
SECURFONDO	0.635673801	0.96	-0.131725221	0.017
TECLA FONDO UFFICI	0.019048054	0.99	-0.584380996	0.358
UNICREDITO IMMOBILIARE UNO	0.809200641	0.67	1	0.474
VALORE IMMOBILIARE GLOBALE	0.373888431	0.49	-0.279946899	0.21

Table 8 Results Obtained by a Fixed Effect Estimator Applied to the Panel Data. Dependent Variable: NAV

Regressors	**Parameter (Standard Error)**
LEV	168.20* (11.46)
CONSTANT	2700.67* (4.98)
* = each parameter is significative at 5% referring to a bilateral test Number of observations = 7959 Number of groups = 21 Observations for each group = 379 $R^2 = 0.36$ Corr(u_i xb) = 0. 5776 F(1,7937) = 215.46 ; Prob>F = 0.000	sigma_u = 1466.12 sigma_e = 82.07 rho=0.5969 (fraction of variance due to u_i) F test that all $u_i = 0$; F(20,7937) = 93364.97; Prob > F = 0.000

Table 9 Results Obtained by a Fixed Effect Estimator Applied to the Panel Data. Dependent Variable: Market Price

Regressors	**Parameter (Standard Error)**
LEV	421.96* (27.44)
CONSTANT	1867.06* (11.93)
* = each parameter is significative at 5% referring to a bilateral test Number of observations = 7959 Number of groups = 21 Observations for each group = 379 $R^2 = 0.0289$ Corr(u_i xb) = 0.5174 F(1,9737) =236.54 ; Prob>F = 0.000	sigma_u = 1095.36 sigma_e = 196.50 rho = 0.9688 (fraction of variance due to u_i) F test that all $u_i = 0$; F(20,7937) = 8623.15; Prob > F = 0.000

The tendency towards higher debt ratios induced by market and regulatory constraints is also confirmed by the results of the cluster analysis, as depicted below in Table 11 (for details please refer to APPENDIX 2).

Table 10 Final Cluster Centers

	Cluster	
	1	**2**
Reg_norm	,029	,341
Exp_life	,394	,416
Res_life	,60600	,58417
Totassets_NAV	1	0

Reg_norm (normalized regression coefficients. NAV discount is the dependent variable).

Exp_life (normalized expired lifetime [expired lifetime/total REITs maturity]).

Res_life (normalized residual lifetime [(tot. maturity – expired lifetime)/expired lifetime/ total REITs maturity]).

Totassets_NAV (REIT manager compensation structure based on total assets [1] or NAV figures [0]).

Older REITs are characterized by significantly higher coefficients than younger REITs, and consistently with an increasing debt trend, REITs with a relative shorter residual maturity experience higher market price discounts on NAVs, while leverage effects on the NAV discounts of REITs with longer residual maturity are less intensive[40]. This result seems to be consistent with

[40] Note, however, that the dividing line between "young" and "old" REITs – also considering the fact that time values have been normalized – is weak due to the early stages of the Italian REIT industry.

the previous regression analysis which shows that NAV is positively related to debt while market prices are unaffected. Positive debt trends – typical of older REITs – therefore lead to higher NAV discounts via increasing NAV share valuations.

Surprisingly, REITs that have a management fee structure based on total assets experience lower regression coefficients than REITs with NAV-based compensation. However, this result needs further investigation in terms of the specific provisions that determine fees based on both values, since both aggregates (NAV and total assets) positively react to leverage.

5. Conclusions

The European REITs and comparable investment vehicles are subject to a severe prudential regulation aimed to protect retail investors by limiting risk. The high regulatory burden is partly offset by a favorable tax-regime. At the same time, the shares of REITs often trade at deep discounts from NAV.

This paper explores how the unique regulatory design of REITs and market context affect capital structure, and in turn, how REIT share values are consequently influenced by the financial decisions of REIT managers. The experience of Italian REITs has been analyzed.

Three major controls – common to the experience of REITs in other European countries – have been investigated. These are: (1) leverage limitations, (2) market price discounts on NAVs, and (3) tax-status. The analysis also considers the impact of NAV as the mandatory valuation criterion of REIT shares both in the case of assessing “official” share value in annual and semi-annual reports and new equity offerings.

The persistence of significant NAV discounts faced by a REIT when it would like to raise new equity capital makes this type of financing for (assumed zero-NPV) investment opportunities unfeasible. Debt issuances (and in very limited amounts, retained earnings) remain the only capital source.

How the legal and market constraints influence REIT capital structures depend on the valuation perspective adopted and the inherently different financial risk perceptions.

From a NAV viewpoint, we argue that the constraints and consequent lack of financial alternatives encourage REIT managers to maximize leverage up to the allowed debt level. This motivation results from the asset-based valuation approach of NAV that basically does not take financial risk into account. Debt financing of investment opportunities generally leads to an increase in share values measured by NAVs. Individual REIT leverage should therefore show

increasing levels over time. Higher leverage ratios are expected to be associated with rising NAVs.

From a financial perspective, however, debt effects on capital structures are uncertain, and depend on the financial theory that best explains financial behavior of REITs. Notwithstanding the capital structure theory applied, financial risks associated with the liability structure are captured by market prices. Should a REIT wish to pursue an optimal liability configuration, regulatory leverage limitations may inhibit its realization. If the leverage ratio chosen by the REIT in a constraint free context were higher than the permitted leverage ratio, the capital structure would be suboptimal; this in turn, would lead to lower share prices than those that would occur in a constraint-free environment. If the optimal debt ratio is lower than the regulatory ratio, the REIT managers would have to forego investment opportunities in order not to alter the optimal WACC.

The key indication is that NAV and financial valuation methodologies perceive capital structure and leverage differently.

Market price discounts from NAVs may therefore be at least partly explained by the diverse views of financial risk in the valuation methods.

An empirical analysis seems to support these indications in which:

(1) for the analyzed Italian REIT population, debt ratios tend to increase over time for almost all entities; i.e., REITs raise most of their additional funds by issuing debt,
(2) NAV discounts are significantly related to leverage (measured as the debt-to-asset ratio),
(3) the discount effect seems largely attributable to NAV increases that result from rising debt levels. On the contrary, share market prices tend to be independent from leverage. The latter result may indicate – but we cannot be certain – that the classic capital theory applies and that current debt ratios are still far below critical levels where bankruptcy costs could come into play, and
(4) older REITs tend to show higher correlations between debt and NAV discounts than younger REITs.

The results appear to be consistent with our perception that REIT managers tend to follow a NAV perspective, regardless of capital structure indications as suggested by the financial theory.

The results have significant policy implications in terms of optimal regulatory design.

Market constraints combined with existing leverage limitations and a NAV valuation methodology have two major effects: (1) they encourage REITs to

leverage up to the maximum debt ratio due by limiting or denying their resorting to additional equity funding; (2) however, debt maximization induced by regulation, generates a compliance risk. It arises in the case of market downturns that lower real estate asset values below leverage limitations. This could force REITs to sell properties at critical points in time at detrimental prices to investors.

Supervisory authorities should therefore reconsider NAV as the mandatory share valuation methodology for reporting purposes and establishing values for new equity offerings. This would allow public REITs to issue new shares at market prices, overcoming the lack of effective financial alternatives to debt. However, as long as NAV methodologies are in force, leverage restrictions may effectively limit the incentive for REIT managers to maximize debt ratios up to critical levels in terms of bankruptcy risk. In this sense, limitations protect (retail) investors. If REIT share valuation moved to a financial approach, REIT leverage limitations could be maintained if the maximum allowed debt ratio were set higher than one that REIT managers would choose to optimize capital structure. In that sense, prudential limitations could be understood as a cap-level intended to prevent reckless financial decisions. However, referring to the Italian experience, there is no theoretical or empirical indication that a 60% debt-to-asset ratio is an adequate limit.

Caveats: Italian REITs are in the early stages of full development, and industry practices and market characteristics are rapidly changing. Data are therefore still limited and do not permit definitive results on all issues. Moreover, additional factors (such as the provision that new REITs may be formed by asset contributions), payout policy, or changes in asset values might be considered. Investigations of the role of such factors provide the questions for further research.

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Appendix 1 Overview of European REITs: Investment Vehicle's Structure, Market Level, Regulatory Features, and Taxation

	Country	Belgium	France	Germany (*)	Italy (i)	Italy (ii)	Netherlands	UK
	Year	**1995**	**2003/2005**	**2007**	**1994-1998**	**2007**	**1969**	**2007**
Vehicle Structure	Open-end (***)	Yes	Yes	Yes	--	Yes	Yes	Yes
	Closed-end (***)	--	--	--	Yes	--	Yes	--
	In terms of fixed equity capital	No. Equity issues allowed.	No. Equity issues allowed.	No. Equity issue allowed.	Yes but equity issues allowed upon articles of association	No. Equity issues allowed.	Yes but equity issues allowed upon articles of association	No. Equity issues allowed.
	In terms of finite life	No. Indefinite lifetime.	De facto no (Finite life extandable upon articles of association)	De facto no (Finite life extandable upon articles of association)	Yes. Finite life.	De facto no (Finite Life Extandable upon articles of association)	Yes/No (Finite or indefinite lifetime)	De facto no (Finite life extandable upon articles of association)
Market Level/Requirements	Public	Yes (Sicafi)	Yes (Siic)	Yes (G-Reits)	Yes (Fondi Immob.)	Yes (Siiq)	Yes (FBI)	Yes (UK Reits)
	Private	--	Yes (Opci) (9)	--	Yes	--	Yes (FBI)	--
	Minimum shareholders requirement	No	Yes (4)	Yes (5)	No	Yes (7)	Yes	Yes (8)
	Market requirements / mandatory listing	Yes (2)	Yes	Yes	No / Yes (10)	Yes	No	Yes

(*Continued…*)

(*Appendix 1 Continued*)

	Country	Belgium	France	Germany (*)	Italy (i)	Italy (ii)	Netherlands	UK
	Year	**1995**	**2003/2005**	**2007**	**1994-1998**	**2007**	**1969**	**2007**
Taxation	Reit's corporate level	De facto pass-through entities	De facto pass-through entities	De facto pass-through entities	De facto pass-through entities	De facto pass-through entities (6)	De facto pass-through entities	De facto pass-through entities
	Mandatory pay out rules (**)	Yes (80% of net profit; cap. gains not subject to distrib.)	Yes (85% of tax-exempt profits; 50% of cap. gains)	Yes (90% of net profit; cap. gains deferred tax.)	No/Upon articles of association	Yes (85% of tax-exempt (RE) profits)	Yes (100%)	Yes (90% of tax -exempt profits; cap. gains not subject to distrib.)
	Reit's corporate level [current income (CI)/cap. gains (CG)]	(CI)Tax-exempt/ (CG)Tax exempt (3)	(CI)Tax-exempt /(CG)Tax exempt (3)	(CI)Tax-exempt /(CG) Tax exempt (3)	(CI)Tax-exempt / (CG)Tax exempt	(CI)Tax-exempt / (CG) *Taxed*	(CI)Tax-exempt /(CG) Tax exempt	(CI)Tax-exempt / (CG)Tax exempt (3)
	Investors' level taxation- domestic corporate inv	Yes. But preferred taxation	Yes	Yes	Yes	Yes	Yes	Yes. But preferred taxation
	Investors' level taxation-corporate Foreign inv	No (Certain conditions to be fulfilled)	Yes (Witholding tax)	Yes (Witholding Tax)	No (Certain conditions to be fulfilled)	Yes (Witholding tax)	Yes (Witholding tax)	Yes (Witholding tax). No tax on cap. gains
	Investors' level taxation-private inv	Yes. But preferred taxation (Witholding tax)	Yes/No tax on cap. gains	Yes/No tax on cap. gains	Yes. But preferred taxation (Witholding tax)	Yes. But preferred taxation (Witholding tax) (3)	Yes.But preferred taxation (3)	Yes.But preferred taxation

(*Continued…*)

(***Appendix 1 Continued***)

	Country	Belgium	France	Germany (*)	Italy (i)	Italy (ii)	Netherlands	UK
	Year	**1995**	**2003/2005**	**2007**	**1994-1998**	**2007**	**1969**	**2007**
Regulatory Features	Reit type	Corporate type (Limited Corp./ Partnership)	Corporate type (Stock Corp./ Partnership)	Corporate type (Stock Corp.)	Trust/Investment Fund	Corporate type (Stock Corp.)	Various types / Mainly Corporate type	Corporate type (Listed Closed End Comp.)
	Mgnt by Trustees / Fund Manager	Mgnt by Ext. Fund Manager / Int. Mgnt Board	Int. Mgnt Board	Int. Mgnt Board	Mgnt by Trustees / Fund Manager	Mgnt Board	Mgnt by Ext. Fund Manager / Int. Mgnt Board	Internal/ External
	Investment limitations / Income rules	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Leverage limitations (**)	Yes (D/E = 1.1) / D/A=65%; Interest exp limited to 80% of tot. income	Yes for enjoying fiscal favorable status	Yes (D/RE assets BV = 55%)	Yes (D/RE assets MV = 60%) + (D/Non RE assets = 20%)	No	Yes (D/RE assets tax BV & Non RE asset tax BV = 60%+20%)	Yes for enjoying fiscal favorable status
	NAV mandatory as share valuation method	No	No	No	**Yes**	No	No	**Yes**

***Notes*:** (1) If passive properties holdings.

(2) At least 30% of shares have to be offered to the public.

(3) Generally referred to as RE investments (see also investment rules). Exceptions may apply.

(4) No single shareholder entitled to hold >60% of share capital; 15% of share capital must be kept by shareholders holding individually < 2%.

(5) At least 15% (25% at the time of IPO) of share capital must be held on a distributed basis (of those 15%, no individual shareholder is entitled to hold > 3%). In general, no individual shareholder is entitled to hold >10%.

(6) Based on rental income. Eighty five percent of income must derive from RE rental or leasing. Other requirements apply.

(7) No single shareholder entitled to hold > 51% of share capital; 35% must be kept by shareholders holding individually < 1%.

(8) No single corporate shareholder entitled to hold > 10% of share capital. Other rules and exceptions apply.

(9) Organisme de Placement Collectif en Immobilier (French non-listed Reits) or Sociètè de Placement à Prèpondèrance Immobilière à Capital Variable (SPPICAV). These vehicles enjoy tax-transaparency. Exceptions apply.

(10) Mandatory listing if shares have a face value < 25,000 Euro (so called "retail"Reits).

(*) Note: Reits have only recently been established. Market is dominated by open-end real estate mutual funds that are not included in the table.

(**) More specific, detailed rules and exceptions apply.

(***) Note: Open-end / closed-end refers to the substantial classification of the REIT structure, not to the legal form. From a regulatory point of view, no REIT is structured as an open-end entity.

MV Market Value

BV Book Value

Sources:

European Public Real Estate Association, *EPRA Global REITs Survey - A Comparison of the Mayor REIT Regimes in the World*, August 2007

PriceWaterhouseCoopers, *Global Real Estate Now - Insights, Observations, and Research*, March 2007

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Gesetz uber Deutsche Immobilien-Aktiengesellschaften mit boersenotierten Anteilen (REIT-Gesetz vom 28. Mai 2007, BGBI I S.914).

Adaptations by the authors.

Appendix 2 Cluster Analysis Details

Initial Cluster Centers

	Cluster	
	1	2
Reg_norm	,106	,185
Exp_life	,820	,420
Res_life	,18000	,58000
Totassets_NAV	1	0

Reg_norm(normalized regression coefficients.NAV discount is the dependent variable)
Exp_life (normalized expired lifetime [expired lifetime/total REIT maturity]).
Res_life (normalized residual lifetime [(total maturity – expired lifetime)/expired lifetime/ total REIT maturity]).
Totassets_NAV (REIT manager compensation structure based on total assets [1] or NAV figures [0]).

Iteration History(a)

Iteration	Change in Cluster Centers	
	1	2
1	,616	,604
2	,000	,000

A convergence achieved due to no or small changes in cluster centers. The maximum absolute coordinate change for any center is ,000. The current iteration is 2. The minimum distance between initial centers is 1,525.

Cluster Membership

Case Number	REIT	Cluster	Distance
1	1	1	,359
2	2	1	,195
3	3	1	,982
4	4	1	,127
5	5	1	,133
6	6	1	,389
7	7	2	,604
8	8	2	,704
9	9	2	,614
10	10	2	,635
11	11	2	,780
12	12	2	,470
13	13	2	,447
14	14	1	,349
15	15	1	,117
16	16	2	,429
17	17	2	,473
18	18	1	,616
19	19	2	,596
20	20	1	,172
21	21	2	,579
22	22	2	,489

Final Cluster Centers

	Cluster	
	1	**2**
Reg_norm	,029	,341
Exp_life	,394	,416
Res_life	,60600	,58417
Totassets_NAV	1	0

Distances between Final Cluster Centers

Cluster	**1**	**2**
1		1,095
2	1,095	

Number of Cases in Each Cluster

Cluster	**1**	10,000
	2	12,000
Valid		22,000
Missing		,000