

Real Estate and Real Estate Finance as a Research Field – An International Overview

by

Wolfgang Breuer* and Claudia Kreuz**

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Abstract. We present a citation-based analysis of the most important journals on real estate and real estate finance over a time period from 1986 to 2010. For each year, those three articles with the highest number of citations according to Google Scholar are identified. A thorough analysis of all 75 selected articles reveals that the focus of interest has been on (1) *empirical* research, (2) mainly using data of *residential* real estate, with (3) the primary objective of evaluating real estate *investment* until the midst 1990s. In order to derive reliable risk-return relations for real estate investment, (4) asset pricing as the main task of real estate *appraisal* is in the centre of attention, too. Appraisal issues have relatively gained importance for the last fifteen years in comparison to investment issues. Interdisciplinary aspects and sustainable issues are only very rarely integrated in appraisal methods, the focus is primarily on maximizing economic returns. Therefore, our citation analysis confirms that the Financial Management Approach of Dasso and Woodward (1980) is the predominant approach particularly in the United States. Our findings regarding our basic sample of articles are cross-checked by several robustness tests. For future research activities, it seems to be quite promising to focus on the one hand on interdisciplinary aspects and on the other hand to contribute to the theoretical foundation of real estate with the aim of developing a common body of knowledge.

Key words: citation analysis, real estate, real estate finance, survey

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* Prof. Dr. Wolfgang Breuer, Department of Finance, RWTH University, Templergraben 64, 52056 Aachen, Germany. Tel.: +49 241 8093539, Email: wolfgang.breuer@bfiw.rwth-aachen.de.

** Dr. Claudia Kreuz, Department of Finance, RWTH University, Templergraben 64, 52056 Aachen, Germany. Tel: +49 241 8093649, Email: claudia.kreuz@bfiw.rwth-aachen.de

1. The Relevance of Real Estate and Real Estate Finance

With the global economy still suffering from the financial crisis which came to its peak in the middle of 2008, it seems no longer necessary to emphasize the importance of *real estate* and *real estate finance* from a factual point of view. As the subprime crisis has vigorously proved, the influence and the spillover effects from real estate markets to other worldwide markets, namely stock markets, bond markets, markets for derivatives, but also non-financial markets as commodity or labor markets, are enormous. In a positive sense, however, due to very high multiplier effects resulting from investments in this sector, real estate is often referred to as an “*economic locomotive*”, since real estate investments have a significant influence on the gross domestic product and on the employment rate (see Nadler, 2001, p. 4).

From a research perspective, real estate – which encompasses real estate finance as a core sub-field – has a much longer tradition in Anglo-Saxon countries than in Germany. The first course in real estate in the United States was held at the University of Wisconsin in 1892 (see Dasso and Woodward, 1980, p. 404), whereas it took almost 100 more years for a real estate discipline being institutionalized in Germany (see Schulte, 2003, p. 100). Although real estate as a discipline has rather been a research niche in the past, its relevance is likely to rise in the future. This might not only be due to the subprime crisis. With real estate locking up a large share of capital of non-property companies as e.g. banks, insurance companies, and industrial corporations (in former times often up to 25 % of the balance sheet sum) and with costs for the maintenance of real estate being one core component of total costs, managing real estate has already become a major issue (see Bone-Winkel and Müller, 2005, p. 32).

Consequently, the aim of our paper is to analyze the status quo of real estate and real estate finance as a research field. Based on our findings and the identified research gaps, we then try to define potential future research fields. Since some empirical studies already evaluated the contents of real estate textbooks, core topics of international real estate conferences, or tried to recover the main real estate issues based on questionnaires of real estate fund managers or institutional investors, we complement these studies by a citation analysis of the most important international real estate journals. In contrast to a simple analysis of textbooks, the investigation of real estate journals should better be suited to identify research issues prevalent in real estate during the last 25 years. Moreover, a citation-based analysis should be more “objective” and more related to research trends than to simply query practitioners. Certainly, similar analyses could be undertaken by looking at main topics on international real estate conferences. However, because of a lack of data this approach is not apt to analyze time periods of up to 25 years and thus is somewhat restricted. Against this background, our citation-based approach can indeed be viewed as a relevant contribution for identifying main research issues in real estate and real estate finance since 1986. The latest other study that is based on an evaluation of journal articles in the field of real estate and also applies citation counts stems from Dombrow and Turnbull (2004), but focuses only on two real estate journals and is somewhat out-dated as it only covers the years 1988 to 2001. Moreover, in contrast to Dombrow and Turnbull (2004), we rely on a comprehensive analysis of citation indicators in order to identify the most relevant topics in real estate (finance), while Dombrow and Turnbull (2004) mainly aim at simply counting the frequency of appearance of certain (not

clearly defined) topics across all articles published in the two journals under consideration. Furthermore, their citation analysis focuses on a ranking of authors and on cross-citations of the two journals to other journals, but not on identifying the most relevant research topics over time. The same is true for a couple of other articles (see for the latest one and the related literature Jin and Yu, 2011)) that try to rank real estate programs by journal page counts: Here, the focus is also on the ranking of *authors* in order to identify the *top-tier universities and schools* for real estate research instead of analyzing *research topics*.

Our paper is organized as follows: In order to define and analyze the topic of real estate and real estate finance, we first give a theoretical overview of the status quo of the research field in Section 2. Out of the theoretical framework, we deduce evaluation criteria for our empirical analysis of real estate finance journals in Section 3. Based on a citation analysis covering the last 25 years of real estate research, we perform an evaluation on the level of individual journals to get an insight into the impact of research related to real estate finance compared to journals in general finance (and economics), and we expand the analysis also to the level of single articles. The resulting main research questions, research trends and research gaps are presented in Section 4. Section 5 concludes with a short outlook.

2. Real Estate and Real Estate Finance – Theoretical Framework

2.1 Real Estate – (Re-) Search for a Discipline?

The quotation “real estate, the academic endeavor, has an identity problem” (Diaz, 1993, p. 183) might already give a hint that describing the research field of real estate is by far not an easy task. One main reason for the difficulty of defining real estate is the complexity of the object. Whereas “real” comes from “realty”, which means land and all things permanently attached to it, “estate” refers to all things that a person owns (see Brueggeman and Fisher, 2005, p. 1). Analyzing real estate therefore implies not only an economic perspective, but also a broader perspective that includes the analysis of issues related to the “land” the object is built on.

Although in 1923 the US National Association of Real Estate Boards already held a conference on real estate with the subtitle “search for a discipline” (see Dasso and Woodward, 1980, p. 404), this search has not been completed yet: Seventy years later in 1993, the American Real Estate Society (ARES) founded a Body of Knowledge Committee in order to come to a consensus on the boundary lines of the discipline and its underlying theories, postulates, laws, and principles (see Black et al., 1996, p. 190).

In the following, we analyze the most important different approaches on defining real estate as a research field so far, taken from the country with the by far longest history in this field, the United States, and present them in Table 1 in chronological order.

>>> Insert Table 1 about here <<<

Until 1967, two separate perspectives were most common: An *urban planning perspective* (concerning the approaches of Mertzke, 1927, and Ratcliff, 1966) and a more *management oriented perspective* (by Wendt, 1949, and Weimer, 1956). Graaskamp (1976) was the first to

introduce a truly *interdisciplinary approach* with real estate being a meta-discipline that should cross the borders of traditional research by deriving knowledge from physical sciences (architecture, soils, environmental science), behavioral sciences (sociology, demography, planning, political science, psychology), and business administration (finance, accounting, marketing, organizational theory, management information systems, law). His approach was enforced by Grissom and Liu (1994) who analyzed in detail the disciplinary overlaps of real estate towards other disciplines.

The general counterpart to Graaskamp, the *Financial Management Approach* of Dasso and Woodward (1980), sets a stronger focus on financial management instead of interdisciplinary sources. Dasso and Woodward picked up the early idea of Weimer that real estate management should serve to maximize shareholder value. They describe their approach by six features: The Financial Management Approach is an extension of (1) general financial management theory, and (2) of the theory of land economics, (3) each real estate object and site must be analyzed and evaluated on an individual basis using (4) quantitative methods and electronic data, (5) all inputs (also revenues or value benefits) have to be evaluated according to their impact in monetary terms and (6) the approach takes a decision-maker's or manager's point of view (see Dasso and Woodward, 1980, p. 412).

Comparing the two main approaches of Graaskamp and Dasso and Woodward, they do not completely contradict each other, they only have different roots and set different foci, as is also noted in Dasso and Woodward (1980), p. 413. Whereas the *Multidisciplinary Approach* of Graaskamp equally derives knowledge from many disciplines with finance as only one possible source, the *Financial Management Approach* defines financial management theory as a starting point and seeks to modify it according to the special features of real estate. Therefore, the Multidisciplinary Approach is much broader and could integrate the Financial Management Approach as one special theoretical concept. In addition to that, the Financial Management Approach itself also includes interdisciplinary aspects in features (2) and (5). What remains different is the main research focus: The objective of the Financial Management Approach is to realize the maximum economic profit out of real estate (either measured in relative terms as *economic return* or in absolute terms, e.g. by *net present value*). The set of objectives of the Multidisciplinary Approach is more complex and puts a stronger focus on sustainability: Next to an economic return, real estate can also generate non-monetary benefits in form of a *social* and/or an *ecological return* (e.g. improvement of living conditions of individual citizens or whole regions, reduction of CO₂ emissions). By applying the approach of Diaz (1993), these two perspectives might be unified: Diaz' first research focus on *economic activity* resembles the Financial Management Approach, whereas the second research focus on *resource allocation* suits the Multidisciplinary Approach.

In line with the Multidisciplinary Approach of Graaskamp, Schulte (2003) has developed a framework that is founded on an interdisciplinary basis taking into account other disciplines like real estate specific law, spatial planning, architecture and engineering. Although real estate as a research field has only a very short tradition in Germany, the framework of Schulte so far gives the most detailed insight into the research field of real estate in a systematic way (see Figure 1).

>>> **Insert Figure 1 about here** <<<

Next to the interdisciplinary base, Schulte forms three more categories, namely *institutional aspects* taking into account the point of view of different real estate actors, *typological aspects* concerning the real estate specific sub-markets, and *management aspects* which are further divided into *strategic*, *functional* and *phase specific aspects*.

According to Black and Rabianski (2003), the focus on real estate research differs throughout the world: In the *United States*, real estate research and education most often have a *finance and investment focus* following the Financial Management Approach of Dasso and Woodward, for the *UK, Australia, and New Zealand* a broader program that encompasses *physical as well as financial concepts* is most common. Especially in the UK, real estate valuation has a long tradition with the *Royal Institution of Chartered Surveyors (RICS)* as an institution worldwide known and of highest reputation due to its standards and academic degrees. In the UK, a common body of knowledge on real estate does not exist, either (see Adair et al., 2002, p. 92). Finally, in continental Europe the interdisciplinary approach seems to dominate.

2.2 The Role of Real Estate Finance as a Major Sub-Field

In the following, we will focus on the special role of real estate finance as a sub-discipline in the overall research field of real estate. Despite the research field of real estate not yet being finally defined, there is no doubt about real estate finance being a core sub-field. According to the Financial Management Approach of Dasso and Woodward, real estate finance is even considered to be the root of the whole research field. In this context, Dasso and Woodward (1980), p. 412, state that “the objective in financial management theory is to maximize the value of the firm. The objective in the financial management of real estate must be to maximize the value of a site.” Furthermore, Dasso and Woodward (among others; see also, e.g., Black et al., 1996, pp. 184-188) proclaim that real estate finance should start out by adapting existing financial theory to the special features of real estate. We subsume these special features in Figure 2 and add the corresponding financial theories as well as potential theoretical and empirical research topics that emerge from these special features.

>>> **Insert Figure 2 about here** <<<

First of all, real estate is a *tangible asset*. This implies that it can be evaluated separately from the actual owner. The possibility to unlink the creditworthiness of the borrower from the valuation of the asset is crucial for real estate finance and was the basic idea of the oldest real estate financial instrument: the mortgage. With the introduction of the lien theory the lender was given a claim on the value of the property which served as a security for the loan. In the case of default, a mortgage contains the right for the lender to claim ownership and the value of the property (see Unger and Melicher, 1978, p. 1; Epley and Millar, 1984, p. 21). Whereas mortgage lending based on the collateral value of the individual property represents the traditional way of financing real estate, more innovative financial schemes have emerged due to the possibility of cash flow related lending: by basing debt repayment schemes solely on the ability of the real estate asset to generate future cash flows. Modern real estate financing is thus no longer subject to financial intermediation: Structured as an off-balance-sheet

transaction that applies asset securitization as the refinancing source, modern real estate financing shows strong disintermediation tendencies (see Ibhler and Lucius, 2003).

The second distinctive feature of real estate is its *indivisibility*. If one only considers direct real estate investments, the purchase and/or development of property always involves a high investment sum and therefore may call for multiple sources of funding. Since many general financial theories are based on the assumption of complete divisibility of the asset (as e.g. Modern Portfolio Theory, the Capital Asset Pricing Model, or the Arbitrage Pricing Theory), there appear to be two ways to cope with this mismatch: On the one hand, these theories may be adapted to limited divisibility, on the other hand, real estate may be transformed into a divisible asset. The latter can be performed by asset securitization that allows for partial investment in real estate. These indirect real estate investments are realized by e.g. buying shares of real estate investment trusts (REITs) as the most prominent example of a fungible real estate asset. However, e.g. for private households seeking for direct investment in residential real estate to live in, overinvestment is still an unsolved problem (see Cauley et al., 2007). Irrespective of a direct or indirect investment in real estate, risk-return predictability seems to be a crucial issue for this asset class.

Another special feature of real estate is its *immobility* (see Epley and Millar, 1984, p. 10; Bone-Winkel et al. (2005), p. 16). Apart from the consequence that demand must come to each site and not the opposite way (as might be the normal assumption for other goods), a location once chosen determines the value of the property much more than the building itself. Therefore, in order to identify the main value drivers for any real estate object, detailed spatial analysis of the macro and micro factors of the location (e.g. prosperity of the region, value of neighborhood properties, proximity to public transport) is crucial for any real estate appraisal. In this context, it becomes obvious why an interdisciplinary perspective plays an important role in real estate: Only by taking into account not solely economic factors, but also social and environmental benefits, efficient real estate pricing is possible. This way, the theoretical base is not only in financial theory, but also stems from non-financial theories like the theory of land economics and the location theory (see Dasso and Woodward, 1980, p. 405-407).

A fourth important feature of real estate is the *heterogeneity* of each property (see Sirota, 1998, p. xvii, and Epley and Millar, 1984, p. 10). Even two identical buildings are not totally alike, since they are always built on different sites. Furthermore, real estate markets are very fragmented compared to markets for standardized assets like, for example, the stock market. Not only are there no national real estate markets, but only regional or even local markets (see Hines, 1999, p. 4), rather the market is also divided by different typologies of real estate leading to the co-existence of at least a commercial, a residential and an industrial real estate market for each region. The low market transparency implies high information and searching costs as one component of indirect transaction costs. Market prices derive from pairwise negotiations rather than they fulfill the assumption of a Walrasian auction (see Quan and Quigley, 1991, p. 127; Epley and Millar, 1984, pp. 427-428). As a consequence, all financial theories that are based on the Efficient Market Hypothesis may not be merely transferred to decisions involving real estate. At the same time, real estate appraisal can by no means be a standardized task, since it always has to take into account the specific geographical, typo-

logical and phase specific features of each property. In addition, when real estate investments are concerned, a standard risk premium does not exist, but is dependent on the individual location of the property and the type of the real estate in its relevant sub-market. However, as a positive outcome of the heterogeneity, real estate assets show low or even no correlation at all to other asset classes, leading to a high diversification potential when viewed from a portfolio perspective.

Closely linked to the heterogeneity of real estate is its high *complexity* (see Diaz, 1993, p. 188). Due to the long development process and the long life cycle of a building respectively the infinite life cycle of a site, real estate is not only quite inflexible to changes in market demand (see Brueggeman and Fisher, 2005, pp. 293-294), but is also considered to be quite a risky investment because of multiple factors influencing the value of property. The types of risk connected with real estate can be basically divided into systematic and unsystematic risk. Systematic risk comprises country risks (e.g. political and legal risks) as well as market risks (e.g. cyclical risks), whereas unsystematic risk categories are even larger and can be divided into location risks (from a macro and a micro perspective) and object risks (e.g. occupancy cost risk and vacancy risk for already existing property or contamination risk and approval risk in project development) (see Gondring, 2010, pp. 283-284). Due to the special features of real estate assets, it is doubtful that the assumption of, e.g., the Capital Asset Pricing Model that unsystematic risk can be fully diversified and may thus be excluded from the risk premium, is suitable for pricing real estate assets. Therefore, theories have to be adapted and at the same time a detailed risk analysis is crucial for any real estate appraisal, investment or lending. Since each property has to be evaluated individually, this leads to even higher indirect transaction costs of third parties involved when buying or selling real estate (e.g. surveyors, consultants, real estate agents, and advertising agencies). Apart from that, direct transaction costs of real estate are also very high e.g. comprising land transfer taxes and fees for notary publics and the land book. Because of the many parties involved, asymmetric information, and high transaction costs, applying New Institutional Economic Theories, in particular Agency Theory and Transaction Cost Theory, might lead to valuable results concerning decision-making in imperfect markets.

By analyzing the special features of real estate, it becomes obvious that due to the heterogeneity and the immobility of real estate each object has to be analyzed and evaluated separately in order to determine its “fair” price (see Dasso and Woodward, 1980, p. 412; Sirmans, 1989, pp. 23-24). This implies that the sub-field of real estate finance and investment has to rely on data generated in the sub-field of *real estate appraisal*, e.g. by market and site analysis (see Hines, 1999, p. 11). Furthermore, due to real estate capital markets being highly imperfect, theories based on the assumption of perfect capital markets, like e.g. the irrelevance theorem of Modigliani and Miller (1958) cannot be applied. As a consequence, *real estate investment* decisions cannot be separated from the respective *financing* strategy (see Sotelo, 1998, p. 206). This might explain why the US real estate research approach is often referred to as an “investment and finance approach” (see Black and Rabianski, 2003, p. 33; Schulte et al., 2004, p. 7).

As a conclusion regarding the theoretical framework of real estate and real estate finance it can be stated that up to now no common body of knowledge seems to exist. Instead, we identify two main approaches, a narrower one focusing on investment and finance topics that is predominant in the United States and a broader interdisciplinary concept with a greater impact in European countries. Since not only the research field lacks a final definition, but also the role of real estate finance within the research field varies largely – from the root of overall research to only one sub-field among many others – we choose a broader context for our empirical analysis in the following section: We evaluate not only the journals that explicitly focus on real estate finance in a narrow sense, but also those journals that deal with real estate related topics on a broader scale. Since especially in the country with the by far longest tradition in real estate research, the United States, the investment and finance approach is most prominent as a general approach to real estate, we would otherwise run the risk of not covering all relevant journals.

3. Empirical Evaluation of Real Estate Journals

In the past years, quite a few empirical studies have tried to identify the most prominent real estate research topics. Some results were even presented as a worldwide comparison by Newell et al. (2004), including the United States, UK, Australia, and Germany. These studies either relied on primary data sources, consisting of questionnaires of institutional investors and real estate fund managers, or evaluated the contents of textbooks and of the most prominent real estate conferences ARES, ERES, and IRES (see for the latter Schulte, 2003). The study of Dombrow and Turnbull, 2004, also aims at identifying trends in real estate research by analyzing articles in real estate journals, but it only covers two US-real estate journals (*Journal of Real Estate Finance and Economics* and *Real Estate Economics*) between the years 1988 to 2001 and their citation analysis focuses on a ranking of authors and on cross-citations of the two real estate journals to other journals, but not on identifying the most relevant research topics over time. In the following, we will complement these studies by a detailed citation-based investigation of the contents of the main real estate journals on a 25-year basis and will then compare our findings to the results of the other empirical studies.

In our empirical evaluation of ten international real estate journals, we follow a two-fold approach: At first, we perform an analysis on the *level of individual journals* by examining the impact of each journal and compare them to other journals especially in the general field of finance in order to gain insight into the relative and absolute importance of real estate issues with a special focus on financial topics. In a second step, our evaluation focuses on the *level of individual articles* to sort out the most relevant research topics during the last decades.

3.1 Comparison of the Journals' Relative and Absolute Importance

In order to get a deeper insight into the research field of real estate, we will perform a citation analysis of the major real estate journals. We include the four leading real estate journals from the United States (see Dombrow and Turnbull, 2002, p. 46): the *Journal of Real Estate Finance and Economics*, the *Journal of Real Estate Research*, the *Journal of Real Estate Literature*, and *Real Estate Economics*. Since we want to focus on financial issues, we add two further US-Journals: the *Journal of Real Estate Portfolio Management* and *Real Estate*

Finance. To allow for a cross-country comparison, we also examine the UK “counterparts”: the *Journal of Property Research*, the *Journal of Property Finance and Investment*, and *Briefings in Real Estate Finance*. For further comparison, we additionally include the *German Journal of Property Research* (Zeitschrift für Immobilienökonomie). We evaluate the citations for each of the ten journals in the last 25 years, 1986 to 2010, to also search for past research trends. The only journal that is not covered over the whole range is Real Estate Economics with its first volume being published already in 1973. All other journals had their first appearance in 1986 or later (see Table 2). The evaluations are based on the citations available in Google Scholar as they appeared in May 2010. In comparison to other citation indexes like Scopus or SSCI/SCI-X, Google Scholar based analyses offer the advantage of a much broader coverage of journals and citations (see e.g., Breuer, 2009 for a more comprehensive discussion of this topic). For example, only two out of the ten real estate journals analyzed in detail in this paper are covered by SSCI/SCI-X. Moreover, Anne-Wil Harzing’s software “Publish or Perish” makes it easy to perform analyses on the basis of Google Scholar (see www.harzing.com) and is also utilized here.

However, citation analyses based on Google Scholar may also face some shortcomings: To a limited extent (8 % in 2005, see Vaughan and Shaw, 2008) Google Scholar includes non-scholarly citations. In addition, the fact that Google Scholar shows weaknesses for older publications before 1990 due to low web presence might affect our empirical analysis starting in 1986. However, since we intend to select articles according to their maximum number of citations for each year, all articles published before 1990 are facing the same problem. The fact that Google Scholar is only updated every two or three months (see Harzing and van der Wal, 2008) seems also to be of minor importance for our rather long coverage of 25 years. Moreover, Google Scholar does not contain all scholarly journals. However, for our analysis it is far better suited than other citation indexes. In particular, because of the low coverage of only two out of ten real estate journals with respect to SSCI/SCI-X, a comparison of all selected journals can only be performed by Google Scholar. Therefore, concerning the research aim of our empirical analysis, the advantages of Google Scholar seem to outweigh its shortcomings. In this context it is interesting to note that Google Scholar generally seems to gain increasing importance for citation analyses (see, e.g., Keloharju, 2008, for a citation-oriented analysis in the field of finance on the basis of Google Scholar).

>>> **Insert Table 2 about here** <<<

By a look at Table 2, it becomes evident that three US-Journals, namely *Real Estate Economics* (*REE*), the *Journal of Real Estate Finance and Economics* (*JoREFE*) and the *Journal of Real Estate Research* (*JoRER*) with altogether more than 85 % of all citations, by far dominate the remaining seven journals with respect to the total number of citations both on the level of individual volumes and on the level of individual articles. At the same time, it appears that US-American journals are clearly superior to the UK-Journals, the latter only having a share of less than 10 % of all citations, while the German journal does not seem to have any impact at all on real estate research activities.

In what follows, we will primarily focus on the top three ranked articles per year that have been published in one of the ten real estate journals mentioned above between 1986 and 2010.

The top three ranking refers to those three articles that have been published in the respective year and show the highest total number of citations until 2010. In this context, we will simply speak of the 75 “most cited articles”, although we have determined them on a year-by-year basis and not looked at a ranking of the 75 articles with the highest number of overall citations for the whole time period of 25 years. We have chosen this year-by-year approach in order to identify trends over time with respect to dominating topics. As a consequence of our approach, in most cases, we are allowed to simply look at total citations instead of, for example, citations per year. We will additionally refer to citations per year only in the rare cases where it is necessary. Real Estate Economics and the Journal of Real Estate Finance and Economics have by far the greatest impact on real estate research in the past. According to Table 3, only less than 11 % of the 75 articles under consideration have not been published in these two journals.

>>> Insert Table 3 about here <<<

When comparing the two most important journals, one has to keep in mind that the Journal of Real Estate Finance and Economics did not start before 1988. Therefore, Real Estate Economics might be overvalued in Table 3, since in 1986 and 1987 this journal ran “without competition”. But despite the different time frames, the remaining other eight journals apparently play only a minor role or no role at all in past research activities. Those 75 top ranked articles will be the subject of our further empirical analysis concerning the most relevant research topics in real estate in the next section.

After having compared the real estate journals with each other, we turn to the question of the general importance of real estate finance topics compared to general finance topics. In order to come to a conclusion concerning the relative importance of the journals analyzed above, we now compare the impact factors of the real estate journals to impact factors of journals in the general field of finance. We use the *Journal Impact Factor* of the Thomson Institute for Scientific Information, which is calculated based on a three-year period, and gives an indication of the frequency with which the “average article” in a journal has been cited up to two years after publication (see Thomson Reuters, 2010). A five-year impact factor exists as well, which is calculated the same way, only based on five years instead of two. Unfortunately, these impact factors are only available for those journals that are SSCI/SCI-X indexed and thus only just for three of all real estate journals of Table 2, Real Estate Economics, the Journal of Real Estate Finance and Economics and the Journal of Real Estate Research (the latter one though with its first impact factor not before 2008). In order to compare these real estate journals to journals with overall financial topics, we select the same journals as Reuter (2009) for his survey on cultural topics in finance journals. Of the 18 journals included in his survey, for 12 journals (see Table 4, upper part) impact factors are available.

>>> Insert Table 4 about here <<<

By ranking the selected journals according to their five-year impact factor (only exception: due to lack of data, the Journal of Real Estate Research is ranked according to its Two-Year Impact Factor 2009), it becomes obvious that the three real estate journals cannot compete with the most prominent journals in general finance: Ten of the twelve other journals show

considerably higher impact factors for five years. The same holds true with respect to the preceding two-year impact factors. In order to gain a deeper understanding of the exact positioning of the three real estate journals, we also refer to Breuer (2009) who reports Google Scholar based citations per article for a selection of finance journals. Thereby, he examines the average citations per year for articles published in three different time periods: 1995-1997, 2000-2002, 2005-2007. Table 4 presents the average of these averages for all finance journals under consideration. As the Journal of Risk and Uncertainty and the Journal of Risk and Insurance are not covered by Breuer (2009), we additionally determined the relevant average of citations per year for these two journals. We did so also for the three real estate journals of Table 4 in order to enhance comparability of results. These additional data were retrieved in September 2010. As can be seen in Table 4, the three real estate journals rank hardly better on this basis so that our previous finding is confirmed.

In addition, in the last column of Table 4, we offer the Handelsblatt score of each journal under consideration. The Handelsblatt ranking combines the top categories of three reputable journal rankings (the Ranking of the Erasmus Research Institute of Management, the Ranking of the German Academic Association for Business Research, and the SSCI/SCI-X), resulting in grades starting from 1 for the highest journal reputation and ending with 0.1 for the lowest. Since (only) two of the three real estate journals have Handelsblatt scores of 0.3 and 0.2 and are therefore lower ranked than 11 out of the 12 journals on general finance, we also add five more journals with a broader economic orientation that also have 0.3 or 0.2 Handelsblatt scores (see Table 4, bottom part). We refrain from Google Scholar citations in these cases because of identification problems. For example, the “Journal of Economics” may easily be confounded with the “Quarterly Journal of Economics” or the “Rand Journal of Economics”. Nevertheless, we are also able to add four important German journals on general business administration for which Google Scholar data are easily identifiable and which also possess Handelsblatt scores of 0.2 or 0.3. Compared to these additional nine journals, only *Urban Studies* and *Economy and Society* offer superior citation features than Real Estate Economics and the Journal of Real Estate Finance and Economics. We may thus conclude that although the relevance of special real estate journals might be restricted and not be able to reach top-level results like A+ journals, real estate journals are by no means of only marginal importance in comparison to the whole universe of economics journals.

Nevertheless, the rather low overall impact of real estate finance journals compared to top journals on general finance might cause adverse selection: Instead of placing real estate finance articles in specific real estate journals, potential authors may prefer general finance journals due to their better standing and ranking. To get an indication of adverse selection tendencies, we picked out the three top ranked journals in Table 4 and searched the abstracts of all articles between 1986 and 2010 for real estate related topics by applying different search terms. Those search terms that lead to positive results in the above mentioned three journals are listed in Table 5.

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When analyzing the contents of the articles that correspond to at least one real estate related key word it becomes obvious that only 28.89 % of all articles (39 out of 135) truly focus on

real estate. Out of the six search terms that show positive results the term “mortgage” (89 hits) dominates, but only one third (30 articles, 33.71 %) in fact focuses on mortgage related issues. All other 59 articles consist either of general theoretical contributions to financial intermediation, analyze asymmetric information topics from a banks' point of view or deal with capital structure optimization. Thus, in these articles mortgages do not play a special role but are only mentioned as one financial instrument among many others.

Most of those 30 articles that deal with mortgages in a narrow sense (13 out of 30: 43.33 %) examine different variations of capital market products that are mortgage-backed (like e.g. Collateralized Mortgage Obligations (CMOs)). Only about one third of these 30 articles (11 hits) really focus on real estate finance by developing optimal mortgage designs or by calculating default or prepayment premiums. The remaining articles deal with past or present real estate crises. Interestingly, the real estate finance focus differs in relation to the journal. In the Review of Financial Studies (Journal of Financial Economics) only 13 (6) articles of the 63 (11) mortgage hits (20.63 %; 54.55 %) remain that truly focus on real estate financing, whereas for the Journal of Finance 11 out of 15 articles (73.33 %) are actually mortgage-related.

The effect that most of the articles – despite their real estate related key words – do not set a focus on real estate becomes even more obvious when analyzing the 15 articles of Table 5 that show results for the search term “real estate”: They are not mainly referring to real estate issues but most often only utilize a real estate data base to examine financial issues that are of general interest and are not exclusively connected with real estate phenomena (for example, data on real estate investment trusts seem to offer certain advantages for capital structure theory testing). Concerning the remaining four key words, the nine hits for “housing” include five articles with a true focus on real estate dealing with the effects of housing investment on portfolio decisions. As Table 6 shows, the three relevant hits for “foreclosure” are already included in the 30 relevant articles analyzed in the context with “mortgage”:

>>> Insert Table 6 about here <<<

Since 5 of the 39 articles mentioned above show double hits for the six search terms, the number of articles in Table 6 is reduced to 34. Interestingly, almost two thirds (22 out of 34) of the articles in Table 6 have been published in 2000 or later, almost half of them (16 out of 34) even later than 2006. This rising interest in (mostly) mortgage related issues also in general finance journals might be well explained by the subprime crisis. However, one has to keep in mind the very low absolute numbers of articles: over 25 years we only find a total of 34 articles with a real estate focus in the three top ranked finance journals. Certainly, this finding fits very well to the understanding of the top ranked finance journals as striving for a general focus on financial issues. In addition, this small number of real estate related articles indicates low adverse selection effects. This thesis is further strengthened by the fact that (according to Table 5) in the Journal of Finance we find a total number of 336 articles that respond to real estate related key words between 1947 and 2010, but only 113 (24) of them after 1973 (1988), which was the year of the introduction of the first (second) important real estate journal, Real Estate Economics (the Journal of Real Estate Finance and Economics). 66.37 % of all real estate related articles published in the Journal of Finance thus appeared

before 1973 and therefore before a specific real estate journal was introduced. This might give an indication that after 1973 the majority of authors aimed for a publication in a specific real estate journal instead of a general one.

Our analysis of real estate related topics in top ranked finance journals leads to two conclusions: Real estate indeed has a rather low impact on the research community and therefore represents only a research niche. At the same time, the results emphasize the necessity of our approach to examine mainly special real estate journals instead of general finance journals, if one is searching for research trends.

3.2 Evaluation of the Most Frequently Cited Articles

In the second step of our empirical analysis of real estate finance journals, we focus on the *level of single articles* in order to determine the relevant *research topics* in real estate finance, past to present. We do not restrict our analysis to articles with a focus on real estate finance, but, in fact, all selected articles, even those that are taken from the journal Real Estate Economics, belong to this field. This finding is a first indicator for the high relevance of the Financial Management Approach to real estate in the literature.

Certainly, the most convincing approach would be to examine in detail *all* articles of *all* ten real estate journals under consideration over the whole time period from 1986 to 2010. Nevertheless, it is clear that such an approach cannot be realized in a reasonable amount of time (e.g., just the two most prominent journals, Real Estate Economics (REE) and the Journal of Real Estate Finance and Economics (JoREFE), altogether contain 1,903 articles in the respective time period). Therefore we have to base our investigation on only a subset of all articles and thus face the danger of drawing incorrect conclusions from this sample of all articles. As a consequence, we have to be very careful in selecting the most relevant articles and we have to apply several robustness checks to find indications for our sample to be indeed representative. In order to define a representative sample, it seems to be promising to refer to those articles with the highest impact on the research community according to their citations. For a selection of representative articles two alternatives seem to be possible:

- *Alternative 1*: We identify those m articles with the highest number of citations over the last 25 years irrespective of their year of publication;
- *Alternative 2*: We analyze the most frequently cited n articles for each year – 1986 to 2010 – in more detail.

Both alternatives have benefits and shortcomings: *Alternative 1* faces the problem that some years might be totally excluded from the sample while other years might be overrepresented, given that the total number of citations may vary considerably from year to year. Thus, the analysis might not cover every year between 1986 and 2010. Another problem with respect to *Alternative 1* arises from the citation criterion itself: The ranking of articles according to their *total number of citations* since their publishing date may disadvantage *new* articles, especially from the most recent years, for being available – and therefore citable – only for a short period of time. Another possibility would be to select the most cited articles referring to *citations per year*. However, since we intend to cover 25 years of research, it seems likely that

in this case *older* articles, especially from the 1980s, may be out-dated and therefore be cited less in the last years. Thus, in contrast to a ranking based on total citations, ranking by citations per year may disadvantage older articles instead.

These shortcomings of Alternative 1 can be overcome by *Alternative 2*: The selection of the same number of n articles for each year offers the possibility to identify chronological research trends. Furthermore, one needs not to decide between total citations and citations per year, since both criteria lead to the same selection of articles for each year. Alternative 2 though also has one disadvantage: We will run the risk of omitting articles with a high number of citations that are only ranked $n+1$ in their year of publication, if these articles appear in a highly cited year and have thus strong “competitors”. Since Alternative 2 seems to be advantageous compared to Alternative 1 except this last shortcoming, we apply Alternative 2 to our citation analysis. However, we will come back to this issue in our robustness check.

Following Alternative 2, we select the top three articles according to their overall citations of every year between 1986 and 2010, summing up to 75 articles for our random sample. In order to get an indication on the citation coverage of our sample, we just look at the two most frequently cited journals, REE and JoREFE, which account for 67 out of the selected 75 articles (see Table 7). By comparing the number of overall citations for each year – 1986 to 2010 – of both journals with the sum of citations of the three most cited articles for each year of each journal, on average one third of all citations (32.83 % for REE and 32.09 % for JoREFE) belongs to the top three cited articles of each journal. Therefore, 3.94 % (75 out of 1,903) of all articles published in the two journals in the last 25 years contain about one sixth of all citations.

We then rank the selected articles according to the decreasing number of overall citations of each article (see column 2 of Table 7). In order to gain insight into the most prominent research techniques and topics, we define the following classification criteria (see columns 6 to 10) mainly relying on the interdisciplinary framework of Schulte (2003) as described in Section 2:

- *Methodological Approach*: Does the article present a *theoretical* contribution as a core element, is its primary focus rather *empirical* or is it merely *descriptive*?
- *Functional Aspects*: Is the article mainly dealing with the research sub-field of real estate *appraisal*, real estate *investment* or real estate *lending*? (Since we focus on real estate finance, this category is of core importance. We modify this category compared to Schulte (2003) in Figure 1 by leaving out real estate analysis and marketing and we use “lending” instead of the not unambiguously defined term of “real estate finance”).
- *Typological Aspects*: Does the article examine a certain real estate sub-market, namely *residential*, *commercial* (office and retail), *industrial* or *special* real estate, does it deal with unbuilt *land*, or does it only refer to real estate in *general*?
- *Institutional and Strategic Aspects*: Does the article focus on special real estate actors, namely the *management* or real estate *servicers* (e.g. real estate developers, real estate

agents) in relation to special corporate strategies (e.g. Corporate Real Estate Management, incentive schemes)?

- *Phase Specific Aspects*: Does the article discuss a special stage in the life cycle of real estate (land development, project development, utilization stage or redevelopment)?
- *Interdisciplinary Aspects*: Does the article contribute to a sustainable view on real estate also taking into account *social* and/or *ecological* components?

>>> Insert Table 7 about here <<<

The average number of citations per year over all 75 articles is 9.07 while for the 34 articles of Table 6 which have been extracted from the three top finance journals it is 14.73 (and 12.44 when only the mortgage related articles are concerned). Although the latter citations were retrieved four months later than the former data, it becomes obvious that the real estate related articles in general finance journals seem to have a somewhat greater impact on the research community when citations are taken as a relevant indicator. However, the relative difference between these citation values is considerably smaller than the corresponding differences between the three top general journals and the three top real estate journals according to the indicators presented in Table 4 (impact factors and citations per article). This comparison also hints at rather low adverse selection effects with respect to the placement of articles on real estate topics rather in general finance journals than in special real estate journals.

Concerning the 75 most cited articles in real estate journals we also analyze the correlation coefficient between the ranking based on total citations and the ranking based on citations per year for the articles of Table 7. We find that the correlation coefficient is quite high with 48.62 % (significantly different from zero on a 0.1 % level).

Paradoxically, the number one ranked article in Table 7 with 466 overall citations (rank #2 according to citations per year) – and therefore almost the double amount compared to the second rank with only 261 overall citations – shows no reference to real estate at all, but is written from a merely statistical point of view. When analyzing the *methodological approach* (see column 6) of the selected articles 59 out of the total of 75 articles (79 %) present empirical approaches applying statistical data, whereas only 16 articles deal with theoretical issues (the articles ranked #39 and #43 contain both elements and are therefore counted twice). The two articles ranked #20 and #36 are merely descriptive. The data base of almost all of the 59 empirical articles only relies on the US real estate market, only five articles (##14, 31, 33, 58, and 70) also or solely use data outside the United States. Within the US-based evaluations, mainly data from US stock exchanges (e.g. prices of individual REITs or REIT based indices like the REIT total return index or the REIT share price index) are applied next to appraisal based indices (mostly the National Council of Real Estate Investment Fiduciaries/Frank Russell Company (NCREIF/FRC) individual property index; see e.g. Miles et al., 1990, p. 403) and sales price collections of different regional and typological real estate sub-markets.

Turning to the *functional aspects* (see column 7), five articles do not fit into the classification of appraisal, investment, and lending and are therefore not included in the calculated percentages. Three of these excluded articles (##1, 20, and 35) are mostly written from a statistical perspective, the remaining two articles we classify as “neutral” since they consist of a literature overview on housing supply (#36) or examine the relation between house ownership and child outcome (#57). In order to uniformly systemize the remaining 70 articles according to the three functional aspects, we rely on the main focus of the article: Articles that concentrate on a specific technique to estimate the value of a single real estate object belong to the category of *appraisal*, whereas articles that examine the prediction of risks and returns of real estate portfolios are classified as *investment*. Articles discussing loan products and the selection of borrowers belong to the category of *lending*. According to the functional aspects, more than half of all remaining articles deal with an investment topic (36 out of 70), almost one third (22 out of 70) are classified as appraisal and only the remaining 12 articles present lending-related topics. In contrast, lending related issues are the most prominent ones when real estate related topics in general finance journals are concerned (see previous section). The high priority of investment related issues and the low priority of lending becomes even more evident when taking into account the rankings: Six out of the top ten ranked articles focus on investment and only one on lending, while the other lending related articles are ranked #41 and below. However, ranking outcomes are not so unambiguous when based on citations per year. Only three of the then top ten ranked articles are concerned with investment issues. This discrepancy hints at the possibility that investment issues are more prevalent in earlier years of our examination period. This conjecture will be verified later on.

With respect to *typological aspects* (see column 8), residential real estate by far dominates the other categories. This becomes even more obvious when taking into account that in Table 7 only those 39 articles are classified as “residential” that exclusively deal with housing data. However, due to the fact that REITs mainly (but not exclusively) invest in residential real estate, all articles on the topic of REITs in Table 7 are subsumed under “general” if not explicitly stated otherwise. Therefore, residential real estate data are the subject of almost two thirds (= 48) of all articles. Commercial real estate data are (exclusively or among other types) analyzed in 13 articles, whereas industrial real estate and the mere land use are only discussed in one article. The reason for the strong domination of residential real estate seems to lie in the best availability of housing data compared to other real estate types (see Dubin et al., 1999, p. 88).

In our further evaluation, we combine Schulte's *strategic and institutional aspects* to one criterion (see column 9), since we do not further differentiate between institutional aspects *inside* the real estate corporation, namely management issues, and the relation to *outside* real estate service corporations. It becomes evident that institutional issues represent only a small niche in real estate research topics. Only six articles with very low rankings (the first one on rank #59, average ranking of the six articles based on total citations: #64, based on citations/year: #60) deal with institutional issues: Three articles take a shareholder value oriented view (##59, 62, and 66) by applying the concept of Corporate Real Estate Management (CREM), two articles focus on real estate agents and their commissioning (#61 and #75) and one article (#60) deals with moral hazard problems between (former) owners

and investors in the context of home equity conversion. Although a lot of articles discuss portfolio management issues, we do not subsume those articles under strategic aspects like in Schulte's "house of real estate economics" (see Figure 1), because all articles only deal with questions on *quantitative* portfolio management concerning the diversification potential of real estate in relation to other financial assets, but not with strategic issues of qualitative portfolio management. Rather, we regard those topics as investment-related and classify them accordingly.

When analyzing *phase specific aspects*, these do not seem to play any role at all in past and current real estate research. Therefore, a respective column is missing in Table 7.

Finally, *interdisciplinary aspects* (see column 10) represent the last systematization criterion derived from Schulte's approach. In this context, it becomes obvious that non-economic factors only play a minor role in past real estate research. Although four articles also cover inter alia social or ecological issues (ranked ##32, 50, 53, and 57), these non-economic factors do not form part of an integrated real estate evaluation concept, but are only examined in relation to specific questions, e.g. environmental issues in real estate appraisal or social discrimination in real estate lending.

In order to get a deeper insight into the detailed contents of the most relevant research topics, we further enhance our evaluation by defining and analyzing *key words* for each article. JEL-Codes only exist for very few of the 75 selected articles and moreover appear to be far too unspecific to provide any closer information on preferred research topics. Therefore, we examine the key words given for 35 out of the 75 articles (the ones in the Journal of Real Estate Finance and Economics and the Journal of Property Research). Since these key words turn out to be very heterogeneous and unstructured, reaching from detailed statistical techniques (like e.g. Kalman Filter Model) to rather meaningless expressions (like e.g. urban watersheds), we reduce and group the given key words to 16 remaining expressions and use these expressions also on those 40 articles in Real Estate Economics and the Journal of Real Estate Research that were published without any key words. In order to also look for research trends during the 25 years covered in our analysis, we evaluate the 16 (new) key words plus four typological sub-criteria not only in total, but also according to their chronological appearance.

>>> **Insert Table 8 about here** <<<

As Table 8 shows, 12 of the 16 derived (new) key words primarily (but not exclusively) relate to functional aspects and are therefore subsumed under the respective function of investment (7 key words), appraisal (3) or lending (2). As for institutional and strategic aspects, the two key words "management" and "services" differentiate between a perspective inside the real estate corporation or outside. "Sustainability" is taken as an indicator for interdisciplinary aspects. The key word "imperfect market" refers to applying real estate specific features to general financial theories and thus relates to no sub-category. Although most of the key words seem to fit rather clearly into one group of aspects, we additionally evaluate the most prominent key word combinations in Table 9 (ranked according to the maximum number of appearances of each key word as displayed in Table 8).

>>> **Insert Table 9 about here** <<<

The overall key word “*imperfect market*” is the most frequent one that appears in the 75 articles analyzed (26 times, see Table 8). This is not surprising, since the Financial Management Approach proclaims as its core issue that general financial theory should be adapted to the specialties of real estate. However, only two of those articles that focus on imperfect real estate markets present an adaptation of general financial theory (#9: Efficient Market Hypothesis; #65: Modern Portfolio Theory), whereas another paper (#39) deals with signaling. The other theoretical papers on imperfect markets rather discuss special market features like market cycles (##19, 23 and 42) or market liquidity (#43). The empirical articles on imperfect real estate markets mostly address the question of how to measure or correct for imperfections. As can be taken from Table 9, imperfect real estate market conditions are subject to empirical research in combination with almost every other key word (except “spatial data” and “sustainability”).

When analyzing chronological research trends one has to keep in mind that the evaluation in Table 8 refers to those 75 articles that show the (first, second and third) most citations for each year between 1986 and 2010, based on total citations counted from the publishing date up to the year 2010. Therefore, these articles represent the research topics that have been most prominent in research regarding *this whole time frame* and Table 8 only offers the time of their publication. For example, a value of 1 in the line “Imperfect market” for 1996 means that the key word “Imperfect market” can be associated with one of the three articles of our total sample of 75 that were published in 1996. Another possibility to analyze chronological effects would be to refer to the exact date of every citation of each article. Then the years with the most citations would indicate a special interest in this research topic *on a yearly base*. We will refer to this alternative later.

A closer look at the chronological key word frequency in Table 8 reveals that the first ten research years covered by our citation analysis are clearly dominated by *investment* topics. This means that the first about 30 articles in our sample in particular address investment issues. Together with the most frequent key word combinations in Table 9, namely the combinations of the key words return, portfolio, risk, REIT, predictability, and indices, we are able to define the first core past research field in real estate finance: The main issue of the articles (all of them empirical) ranked ##3, 4, 8, 11, 12, 14, 15, 16, 25, 30, 33, 34, 37, 40, and 48 are the risk-return characteristics of tradable real estate assets and their diversification potential in relation to other asset classes. These papers also apply indices, either based on appraised data or market data, for their investment decision. Since the REIT is “the” indirect real estate investment object on US-American stock markets, not surprisingly nearly all articles base their empirical analysis on US-REIT data (only #14 and #33 also include European data). A minor issue in portfolio-related research is on the portfolio choice of homeowners, their investment versus consumption motives and the overinvestment problem (referred to by the key word “consumption”, see ##29, 40, and 65). While “return” and “REIT” nearly always occur in combination with portfolio-related issues, a few articles focus on special *risk* issues as systematic risk (#22), inflation (#26), hedging (#33), moral hazard (#60), and default risk (#73).

Investment topics clearly dominate in the first ten years of our empirical analysis. However, two thirds of all articles classified as appraisal were published after the year 2000. Here we find the second important core issue in past real estate research: alternative evaluation methods for pricing single real estate objects. In general, two methods of estimating the value of property dominate: the hedonic approach and the repeat sales method. Hedonic pricing is based on the idea that an object (here: the building and its site) can be decomposed into its constituent characteristics. This approach seeks for pricing methods for each characteristic in order to derive the overall value of the object and its main value drivers. On the contrary, the repeat sales approach determines the expected value of property not by decomposing the asset, but it relies on area-wide appreciation rates to update the last available transaction price (see Pennington-Cross, 2006, p. 193). The hedonic approach seems to be the most prominent one (12 appearances, see Table 8). Some of these articles deal with the hedonic approach in general (as #6 and #31), while others focus on one specific decomposed characteristic and try to explore ways how to measure the impact of this special feature on the overall price of the real estate object (as e.g. environmental quality (#32), landfills (#50), or railways (#63)). In contrast to that, articles #2 and #21 mainly apply the repeat sales method, whereas articles ranked ##18, 24, 27, and 64 present an empirical comparison of both approaches. Furthermore, Table 9 shows a frequent combination of the hedonic approach with spatial analysis. Real estate prices often are spatially autocorrelated because neighborhoods share location amenities and frequently develop at the same time, thus having similar structural characteristics (see Basu and Thibodeau, 1998, p. 61). Therefore, spatial analysis is a valuable source for various components in appraisal methods that are based on hedonic pricing (see ##6, 31, 32, 56, 63, and – though only descriptive – #20).

As shown in Table 9, the key word “indices” also relates to the hedonic approach and the repeat sales approach. This context becomes obvious when taking into account that real estate performance measurement frequently relies on indices. One prominent type is the NCREIF Property Index mentioned above, which is based on transaction prices as the outcome of the repeat sales approach (see Geltner, 1993, p. 326). Here, the connection of the two core research fields identified so far becomes clear: The derived single property values in the sub-field of real estate appraisal are combined to real estate indices. These indices are of high value for the real estate investment sector, as they strongly support investors' decision-making and portfolio management (see Table 9, relations to “return” and “risk”). Referring to this link of the appraisal and the investment function, other articles (of quite high ranks: ##9, 10, 14, 22 and 42) address unsmoothing techniques that can be applied when real estate indices are based on smoothed real estate appraisal data and therefore display too low second moments that may otherwise lead to inefficient investment decisions (see again Geltner, 1993, p. 325).

As already indicated in the first place, the function of *real estate lending* is minor both in numbers and ranks based on total citations compared to real estate investment and appraisal. As anticipated, however, lending topics recently have gained importance with the subprime crisis becoming a worldwide issue: More than half of the lending articles appear after 2003 and mostly refer to the crisis (##44, 67, 69, and 73 based on overall rankings, but ##12, 54, 52, 17 based on citations per year). In the 1990s, before the emergence of the subprime

market, articles on lending issues mainly dealt with default rates and discrimination (##5, 41, 53, and 55).

With regards to *institutional* and *interdisciplinary aspects*, their role in past real estate research is very limited, both in time and in combination to other issues. Three low-ranked articles address management issues of REITs (##59, 62, 66, based on citations per year: ##57, 38, 61). Finally, interdisciplinary aspects show key word combinations with the hedonic approach and spatial data (see Table 9), however, on a very low level.

As a result, two core research topics emerge from our empirical analysis of the 75 most cited articles in real estate journals over the last 25 years: investment strategies with diversification in real estate assets and different techniques in real estate appraisal. Interestingly, there seems to be a switch in the impact of the articles on the two topics over time: While the articles with the highest overall impact on investment related research are published until the midst 1990s, the most cited articles concerning appraisal issues appeared after 1997.

Another interesting fact evolves when comparing the identified core research topics with their publication source: Although more specific journals exist that explicitly focus on quantitative topics (like Real Estate Finance or the Journal of Real Estate Portfolio Management), the corresponding articles are published in the more general real estate journals like Real Estate Economics, the Journal of Real Estate Finance and Economics and the Journal of Real Estate Research. For example, many of the 75 articles analyzed deal with portfolio management issues, but none of these articles is published in the corresponding Journal of Real Estate Portfolio Management. This might suggest that the research field is too small for journals that focus on very specialized themes.

3.3 Robustness Checks

To check the robustness of our main findings and research trends, we perform *three additional analyses* covering the following topics:

- At the beginning of Section 3.2 we mentioned two alternatives on how to select a representative sample. Since we have based our analysis on Alternative 2 by taking the top three cited articles per year, we now also perform Alternative 1 as a cross-check. In this context, we will refer to Alternative 1a, when we rank the most cited articles according to their *total citations*, and to Alternative 1b, when we select the most cited articles according to *their citations per year*.
- In order to further emphasize chronological trends in functional aspects in real estate research we enlarge our sample to 1,000 articles by selecting the *first 20 most frequently cited articles* per year 1986 to 2010 of both REE and JoREFE.
- Finally, as to the 75 articles of our original sample selected and analyzed in the previous section, we extend our citation analysis by taking into account not only how often an article has been cited up to the year 2010, but also *when* these citations have taken place. This contributes to a more detailed insight into chronological research trends.

Our *first additional analysis* consists of the selection of the top cited articles following total citations (Alternative 1a) or citations per year (Alternative 1b) irrespective of the year the

articles have been published. For simplification, we only include articles from REE and JoREFE, since those two journals account for 89.33 % (67 out of 75) of the articles that were analyzed in Section 3.2. Comparing the remaining 67 articles that have been selected by performing Alternative 2 with the TOP 67 selected articles of Alternative 1, we find a conformity of 59.70 % (40 out of 67 articles) for Alternative 1a and 55.22 % (37 out of 67 articles) for Alternative 1b. As presented in Table 10, we classify the resulting 67 articles for each alternative according to our selection criteria presented in Section 3.2 (the criteria in column 1 and 3 again allow for multiple choices and therefore might not sum up to 67).

>>> Insert Table 10 about here <<<

For columns 1, 4, and 5 of Table 10, we find only very slight differences between the three selected samples. For the functional aspects in column 2 we also see no trend reversal, however, it is interesting to note that for Alternative 1b *appraisal* and *investment* articles even out, whereas for the other two samples investment clearly dominates. For the typological aspects in column 3 we see a trend reversal concerning the ranking of *general* versus *commercial* research objects.

>>> Insert Table 11 about here <<<

As expected, the two selection alternatives, 1a and 1b, show chronological distortions. According to Table 11, it is obvious that the ranking of articles according to total citations is in favor of older articles whereas the opposite is true for a ranking by citations per year. Therefore, the hypothesis of our basic analysis concerning trends in real estate research cannot be rejected, since appraisal issues even out investment issues (only) in the case of sample 1b, where younger articles dominate older ones. This could support our findings that articles with investment issues and a high impact on the research community are mainly published in the earlier years of our analysis, whereas appraisal catches up in the later years.

In order to further explore this hypothesis of a trend reversal in the impact of functional aspects, we perform a *second additional analysis*. Since Table 11 shows that an application of Alternative 1 implies chronological distortions in the selection of articles, we stick to Alternative 2, but this time considerably enlarge the sample: As already stated for our basic analysis, on average one third of all citations of the two most prominent journals (32.83 % for REE and 32.09 % for JoREFE) belongs to the top three cited articles of the respective journal. By enhancing the number of articles analyzed per year to 20, we are able to cover on average 92.60 % of all citations for REE and 86.72 % of all citations for JoREFE regarding the respective time frame of 1986 to 2010. The classification of the functional aspects leads to the following results presented in Table 12. Thereby, each article is classified according to its year of publication, i.e. in the column 1986–1990 we display the total number of citations that belong to those articles under consideration that were published in this specific time period.

>>> Insert Table 12 about here <<<

By summing up the number of citations for each article according to its functional aspect for a five-year period, we find further indications for a trend reversal of investment and appraisal topics: The most cited articles published up to the mid 1990s belonged to investment topics,

whereas from the mid 1990s onwards we see a shift towards appraisal topics that remains until 2010. Lending topics are running on third place for every period of time, varying between 13 % and 27 % of all citations for the respective years.

Although we have now been able to determine by which topics articles from certain years mainly contributed to scientific disputation, one may object that analyzing the exact dates *when* those citations have taken place may offer a completely different picture of the evolution of the most relevant issues in real estate. In order to get insight into chronological effects also from this point of view, we therefore perform a *third additional analysis* by taking a closer look at the exact dates of the citations for each of the 75 articles. We once again use Google Scholar to determine the yearly distribution of citations. This means, for example, that citations for an article published in 2009 are classified into “number of citations in 2009” and “number of citations in 2010”. Figure 3 shows the aggregated numbers of citations for each of the three functional aspects, appraisal, investment, and lending, divided by the number of articles included in our analysis up to the respective year in order to standardize the figures: This means e.g. for the functional aspect “investment” (or “appraisal”) in 1988, which is the third year of our evaluation, that 15 citations in this year of the nine articles already included by then (= the top three cited in 1986, 1987, and in 1988), refer to those of these nine articles that address investment issues (and two of all citations refer to appraisal articles), which leads to $15/9 = 1.67$ for investment (or $2/9 = 0.22$ for appraisal) in the year 1988.

>>> **Insert Figure 3 about here** <<<

The citation analysis on a yearly base shows similar results concerning the importance of the three functional aspects. In Figure 3, the predominant role of investment research topics throughout the 25 years becomes even clearer. However, since the beginning of the 21st century, the interest in appraisal issues has been rising steadily, almost reaching the number of investment related citations in 2009. Lending based citations also rise from the beginning of the 21st century onwards, but on a much lower scale. This might partially be explained by the fact that real estate lending topics are more often published in general finance journals than investment and appraisal topics. Figure 3 also indicates that citations in Google Scholar for the years before 1990 indeed seem to be rather low. This fact is further stressed by Table 12: The total number of citations for the five-year period 1986-1990 is considerably lower compared to the following two five-year periods in the 1990s. This is not true for the total number of citations from 2000 onwards, but here we expect the number of citations still to rise due to the rather short period of time these articles have been published.

All in all, the three additional analyses of our robustness check underpin our main findings of our basic analysis in Section 3.2. The cross-check with the 67 most cited articles according to Alternatives 1a and 1b shows very similar results for all selection criteria in comparison to our basic sample. The enlarged sample of 1,000 articles and the more specified citation analysis focusing on the years citations have actually taken place confirm our chronological research trends of our basic analysis. However, it must clearly be admitted that our conclusions are solely based on more or less extensive samples of articles. In particular, it might be that in contrast to our findings, Figure 3 would look different when based on all articles from all ten real estate journals under consideration. This means, it is possible that there is no increase in

the relevance of appraisal issues based on citations per year when we look at the whole universe of real estate articles. However, we observe this trend when looking at the top articles and we know from Table 12 that total citations from 1986 to 2010 of articles of earlier periods are mainly referring to investment issues while citations of articles from later points in time are more focused on appraisal issues. Therefore, though our conclusions are not based on a year-by-year citation analysis of all real estate articles from 1986 to 2010, we are convinced that we have found strong evidence for our main results.

4. The Most Relevant Research Fields: Past – Present – Future

As a result of our empirical analysis of the major real estate finance journals, we are able to come to rather distinctive conclusions concerning the most prominent *past research topics* in real estate. The classification of the most cited articles of the past 25 years clearly reveals that the focus of interest has been on (1) *empirical* research, (2) mainly using data of *residential* real estate, with (3) the primary objective of evaluating real estate *investment*. In order to derive reliable risk-return relations for real estate investment, (4) asset pricing as the primary task of real estate *appraisal* is in the centre of attention, too. Interdisciplinary aspects and sustainable issues are only very rarely integrated in appraisal methods, the focus is primarily on maximizing economic returns. Therefore, our citation analysis confirms the statement of Black and Rabiński (2003) as well as Schulte (2003), that the Financial Management Approach of Dasso and Woodward (1980) is indeed the predominant approach in the United States. In Figure 4, we try to combine past and present research activities with potential future research trends.

>>> **Insert Figure 4 about here** <<<

The strength of the past US-research activities lies in their detailed empirical analysis of single real estate specific issues applying advanced statistical methods and thereby contributing to the excellent real estate related data base already existing in the United States. However, only very few publications intend to broaden the view from a single-objective financial perspective to a multi-objective interdisciplinary perspective. Moreover, those few publications that follow this train of thought, only do so in rather a sporadic way by merely focusing on single environmental (e.g. energetic) or social (e.g. racial) features. A truly interdisciplinary approach though should start out from a multidimensional set of objectives including economic, ecological, and social indicators at the same time. Due to the more complex set of objectives, special attention has to be paid to the interaction of the different aims: E.g. when comparing traditional buildings to green buildings, hardly ever would merely profit-oriented decision-makers favor the environmentally valuable alternative, since energy savings might not compensate for the higher construction costs. Only when sustainability factors like CO₂ reduction, personal well-being and image effects are included, the decision might be in favor of green buildings. As a prerequisite, sustainability indicators have to be defined and measured. Up to now, no systematic approach yet exists that would allow to integrate value contributions of economic, ecological and social kind to evaluate sustainable investments. However, hedonic pricing may be a promising approach to do so. As a result, appraisal techniques integrating interdisciplinary components would stimulate sustainable real estate investments. This way, real estate portfolio management could also broaden its view to

ethical investments. Apart from that, not only private institutional investors could benefit from a systematic approach to measure sustainable investments. Also public entities would be able to channel more efficiently their scarce public budget into sustainable real estate projects like schools, cultural facilities, or the redevelopment of deprived sites.

As far as theoretical research topics are concerned, the lack of theory in real estate related issues was once commented on by Harry Markowitz by saying that real estate researchers “ought to develop [their] own real estate theory which addresses itself very much to the illiquidities of the problem” (unpublished quote, cited from DeLisle and Worzala, 2000, p. 55). Since especially in finance many widely accepted theories exist, it may not be necessary to follow Markowitz and develop a new theory, but to enhance and adapt existing concepts to the special features of real estate (see Figure 2 with respect to the Financial Management Approach). Although these theoretical contributions that attempt to adapt general financial theory to the specifications of real estate are only scarcely included in our empirical analysis, publications exist that address these issues (see for an overview e.g. Seiler et al., 1999, p. 169, McDonald, 2005, as well as Jandura and Rehkugler, 2001).

In this context, however, it might also be interesting to focus on rather new financial theories. Since decision-making in real estate is often far from being rational, traditional financial theory based on the assumption of rational economic man is not able to cover the full range of real estate decisions (see also Black et al., 1996, p. 184). As a consequence, new developments in financial theory like e.g. *behavioral finance* could also be taken into account when real estate finance is concerned (see Hendershott et al., 2006). Based on these findings, modified incentive schemes might be able to contribute to institutional aspects concerning efficient real estate management.

In this regard, it is quite surprising to see that *risk management* plays no special role in real estate related literature, although real estate involves very many different risks that are hard to diversify due to the special features of the asset (see Section 2.2). The reason for this lack of interest in risk management may be connected to the core research topics that emerge from our empirical analysis: In the center of attention are indirect real estate investments tradable on a liquid stock market. This way, many of the shortcomings described in connection with imperfect real estate markets for direct real estate investment can be alleviated, while risks are diversified. However, the subprime crisis has impressively proved that risk in real estate financing has been highly underestimated and that new risk management concepts have to be developed. Therefore, real estate risk management has to go back to the original underlying assets of the issued bonds and shares and has to rely on individual appraisals and feasibility studies instead of standardized rating reports.

Finally, when combining a theoretical concept with the interdisciplinary perspective, we turn to the lacking “body of knowledge” in real estate. The absence of commonly defined research goals and the want of theoretical foundation lead to the disadvantage that real estate has less depth of progress than other disciplines (see Diaz, 1993, p. 191, and Dasso and Woodward, 1980, p. 410). One potential reason has been revealed by our empirical analysis: None of the 75 articles addresses the overall question of a common body of knowledge or a conceptual design for real estate as a whole. Instead, in particular in the United States, case studies, very

detailed empirical analyses, contents of business school courses and practical experiences serve as a starting point to derive formalizations on a more abstract level (see Pearson, 1989, p. 7, and Epley, 1996, p. 230). However, this *inductive* way of knowledge generation case by case has to be complemented by a counterpart: This could be a *deductive* approach that clearly defines the main research questions, research fields and its sub-disciplines on a more general level and also separates the research field from adjoining disciplines.

Taking into account cultural aspects, Anglo-Saxon countries rather seem to follow the “case-law-approach” as can e.g. be seen by the development of the accounting system out of thousands of individual case studies (US-GAAP or also IFRS). Germany, on the contrary, may rather stand for a “code-law-philosophy” when e.g. accounting systems are developed by first outlining a few binding and general rules that have to be adapted to individual case studies in a second step. Concerning further research in real estate, this first general step is still missing and thus could be a promising research topic in the near future. Therefore, German real estate research – that compared to Anglo-Saxon countries seems to have a backlog regarding empirical research on current and historical risk and returns of real estate assets – might find its own research access by rather pursuing the deductive path that has been initiated by Schulte's systematization in his “house of real estate economics” in order to contribute to closing the theoretical gap of the discipline.

This conclusion stands in line with the results of other empirical studies on the most prominent real estate research topics mentioned above. Schulte (2003) as well ends by enumerating possibilities that might lead to a strengthening of the interdisciplinary and more holistic research approach on real estate. His evaluation of the papers presented at ARES, ERES, and IRES between 1999 and 2001 also reveals that investment and finance topics strongly dominated the conferences (between 44 % and 50 % of all topics), followed by appraisal issues (35 % to 39 %). Institutional aspects, Corporate Real Estate Management and all non-investor perspectives (like, e.g., project developers and real estate users) next to interdisciplinary topics also played a minor role or no role at all at these conferences. In contrast to our findings, however, he only states weak interest in portfolio issues, but this may be due to the fact that he only evaluated the conferences from 1999 to 2001.

The study of Dombrow and Turnbull (2004) also analyzes trends in real estate research by evaluating the Journal of Real Estate Finance and Economics and Real Estate Economics between 1988 and 2001. However, the results can only be compared to our study to a limited extent, since Dombrow and Turnbull only use a one-dimensional approach to classify the contents of the articles. This means, for instance, that they only classify an article topic as *either* “investment” *or* “residential”, but not as “investment” *and* “residential”. Taking into account the limited comparability, Dombrow and Turnbull display the following ranking of topics considering *all* articles published in the two journals between 1988 and 2001 (see Dombrow and Turnbull, 2004, p. 50): 24.53 % deal with mortgage related topics, 21.61 % with investment topics, 18.22 % with appraisal, whereas institutional issues are (in line with all other studies) of only minor importance (3.15 %). 12.62 % of all articles focus on residential real estate while only 5.49 % are nonresidential. Surprisingly, almost one fourth of *all* articles focus on lending, but at the same time our study reveals that lending is by far the

least important functional aspect when analyzing only the *top three cited* articles for the years 1988 to 2001 (here, only 5 articles out of 42 deal with lending). The same holds true with respect to the distribution of citations for our sample of 1,000 articles underlying the figures of Table 12. This might be another indicator that lending related articles with a very high impact on the research community are rather published in (higher ranked) general finance journals than in specific real estate journals. Dombrow and Turnbull also perform a citation analysis. Since they concentrate on the comparison of journals and of the most prominent authors, their findings cannot be compared to our study.

As to the results of the international comparison of Newell et al. (2004), little can be said in relation to our findings. Since that study was based on questionnaires developed by the US-authors that addressed institutional real estate investors only, the focus of that study was already confined to investment and finance issues, neglecting a broader interdisciplinary perspective. Thus, only the choice of questions also indicates that the main interest of researchers and practitioners is concentrated on the same quadrant as indicated in Figure 4.

5. Outlook

Inspired by the quotation “real estate, the academic endeavor, has an identity problem” (Diaz, 1993, p. 183), we performed an empirical evaluation of the most relevant research topics in real estate based on a citation analysis of real estate journals covering the last 25 years of research. The evaluation criteria for our analysis were derived from the two most prominent perspectives in real estate, the Financial Management Approach on the one hand and the interdisciplinary perspective on the other hand. The results of our empirical analysis paint a fairly clear picture of the status quo of the discipline.

The two US-Journals *Real Estate Economics* and the *Journal of Real Estate Finance and Economics* are by far those specialty journals with the highest impact on the research community. However, compared to the impact of other journals that focus on general financial issues, their importance is rather limited.

When evaluating the 75 top ranked three articles for each of the past 25 years according to their total number of Google Scholar citations, we find that these articles present mostly *empirical* research approaches and mainly apply data of *US-residential* real estate. The first core research topic that dominated real estate related literature until the midst of the 1990s, was in the field of real estate *investment* and dealt with the risk-return relations of real estate related tradable assets and their role in a multi asset portfolio. The second core research topic that was in the centre of attention from the mid 1990s onwards is related to real estate *appraisal* and examines different techniques of asset pricing.

As a further outcome of our empirical analysis, we also identified certain *research gaps*. On the one hand, only very few articles try to examine real estate from an integrated and interdisciplinary perspective also taking into account non-economic features like ecological and social issues. Furthermore, we find strong evidence that the “identity problem” of the real estate discipline cited above seems to be still valid: None of the articles covered in our analysis addresses itself to the question of defining a common body of knowledge on real estate. At the same time, also very few articles focus on theoretical real estate concepts on a

more specific level, e.g. by adapting certain general financial theories to the specific features of real estate. Therefore, for future research activities it seems to be quite promising to focus on the one hand on interdisciplinary aspects of the discipline and on the other hand to contribute to the theoretical foundation of real estate.

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Author	Year	Approach
Mertzke	1927	Land Economics Approach
Wendt	1949	Real Estate Economics Approach , sub-disciplines: brokerage, finance, appraisal, management and development
Weimer	1956	Business Administration Approach : real estate management to maximize shareholder value
Ratcliff	1966	Revival of Land Economics Approach, stressing the importance of city planning, regional science economics and urban land economics as sub-disciplines
Rowlands	1967	Unification of approaches by combining micro-decision processes of the firm and macro-complexity of the environment; preparation of Multidisciplinary Approach
Graaskamp	1976	Multidisciplinary Approach : Real estate should not be confined to one discipline but be multidisciplinary
Dasso and Woodward	1980	Financial Management Approach (in the line of Weimer): Extension of the financial management framework to real estate: Introduction of Corporate Real Estate Management
Diaz	1993	Systematization and Unification of Approaches: Economic activity versus resource allocation
Grissom and Liu	1994	Integrative Philosophical Basis for real estate discipline (in the line of Graaskamp)

Important contributions to real estate as a scientific discipline are presented in chronological order.

Table 1: Contributions to a common body of knowledge in real estate

Journals:	Total no. of citations	%	Years covered	No. of volumes per journal	No. of articles per journal	No. of articles per volume	No. of citations per volume	No. of citations per article
Real Estate Economics (USA)	17,859	33.06%	1986* - 2010	25	838	34	714	21
Journal of Real Estate Finance and Economics (USA)	17,966	33.26%	1988 - 2010	23	1065	46	781	17
Journal of Real Estate Research (USA)	10,428	19.30%	1986 - 2010	25	727	29	417	14
Journal of Property Research (UK)	2,673	4.95%	1989 - 2010	21	300	14	127	9
Journal of Real Estate Portfolio Management (USA)	2,174	4.02%	1995 - 2010	16	319	20	136	7
Journal of Property Investment and Finance (UK)	2,140	3.96%	1990 - 2010	21	511	24	102	4
Journal of Real Estate Literature (USA)	591	1.09%	1997 - 2010	14	120	9	42	5
Briefings in Real Estate Finance (UK)	104	0.19%	2001 - 2005	5	122	24	21	1
Real Estate Finance (USA)	75	0.14%	2002 - 2010	9	938	104	8	0
German Journal of Property Research (G)	13	0.02%	2002 - 2010	9	30	3	1	0

* First issue in 1973

Most important real estate (finance) journals in the US, the UK, and Germany are presented with their respective number of citations according to Google Scholar.

Table 2: Comparison of an international selection of real estate (finance) journals

Journal:	Ranking: 1	Ranking: 2	Ranking: 3	Total	%
Real Estate Economics (USA)	12	9	11	32	42.67%
Journal of Real Estate Finance and Economics (USA)	11	14	10	35	46.67%
Journal of Real Estate Research (USA)	1	2	4	7	9.33%
Journal of Property Research (UK)	1			1	1.33%
Journal of Real Estate Portfolio Management (USA)					0.00%
Journal of Property Investment and Finance (UK)					0.00%
Journal of Real Estate Literature (USA)					0.00%
Briefings in Real Estate Finance (UK)					0.00%
German Journal of Property Research (G)					0.00%

For each year from 1986 to 2010 the top three most cited articles are selected from the journals presented in Table 2. Table 3 reports the origin of these 75 top ranked articles.

Table 3: Origin of selected 75 top ranked real estate finance articles under consideration

Journal:	Two-Year Impact Factor 2005	Two-Year Impact Factor 2006	Two-Year Impact Factor 2007	Two-Year Impact Factor 2008	Two-Year Impact Factor 2009	Five-Year Impact Factor 2004-2008	Citations/ Article (Google Scholar)	HB Scores
Journal of Finance	2.549	3.257	3.353	4.018	3.764	6.536	53.05	1
Journal of Financial Economics	2.385	2.494	2.988	3.542	4.020	5.675	54.03	1
Review of Financial Studies	1.893	1.701	2.160	2.640	3.551	4.465	42.04	0.7
Journal of Financial and Quantitative Analysis	1.000	1.243	1.342	1.231	1.603	2.259	31.04	0.7
Journal of Banking and Finance	0.531	0.769	0.753	0.997	1.908	2.200	17.23	0.5
Financial Management	0.976	1.273	1.000	0.889	0.727	2.158	13.35	0.5
Journal of Corporate Finance	0.883	1.12	1.354	1.700	1.628	2.073	16.52	0.5
Journal of Risk and Uncertainty	2.100	0.846	1.122	1.020	1.519	1.984	24.83**	0.5
Mathematical Finance	1.345	1.102	0.984	1.237	1.214	1.837	26.69	0.4
Journal of Financial Intermediation	1.118	1.194	0.805	0.773	1.364	1.767	28.01	0.5
Real Estate Economics	0.451	0.704	0.640	0.778	0.647	1.236	21.31**	0.3
Journal of Real Estate Finance and Economics	0.473	0.573	0.372	0.396	0.659	0.907	16.87**	0.2
Journal of Risk and Insurance	0.328	0.722	0.305	0.914	0.612	0.895	21.18**	0.4
Journal of Real Estate Research	n.a.	n.a.	n.a.	0.439	0.585	n.a.	14.34**	n.a.
Journal of Portfolio Management	0.464	0.291	0.336	0.288	0.455	0.545	11.18	0.3
Urban Studies	0.988	0.992	1.274	1.381	1.301	2.138	n.a.*	0.3
Open Economies Review	0.364	0.279	0.143	0.328	0.284	0.394	n.a.*	0.3
Economy and Society	1.125	1.500	1.678	1.655	1.527	2.553	n.a.*	0.2
Journal of Economics	0.394	0.365	0.377	0.708	0.592	0.753	n.a.*	0.2
American Journal of Economics and Sociology	0.094	0.205	0.192	0.349	0.282	0.381	n.a.*	0.2
Management International Review	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	16.63**	0.3
Zeitschrift für betriebswirtschaftliche Forschung	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	13.25**	0.2
Schmalenbach Business Review	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	9.83**	0.3
Zeitschrift für Betriebswirtschaft	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	7.44**	0.2

*not available in Breuer (2009), **determined by the authors in September 2010, all other Google Scholar scores taken from Breuer (2009)

Real estate (finance) journals are compared to top ranked general finance journals and to a selection of general journals in the field of economics and business administration with comparable Handelsblatt (HB) scores. Citation analysis is based on the SSCI/SCI-X database for factors and on Google Scholar for citations per article (based on averages for articles published 1995-1997, 2000-2002, 2005-2007).

Table 4: Impact factors of general finance and economics journals in relation to real estate (finance) journals

Search term:	real estate		mortgage		REIT		housing		household portfolio		foreclosure		Total per journal	
	all	relev.	all	relev.	all	relev.	all	relev.	all	relev.	all	relev.	all	relev.
Finance journal:														
<i>Journal of Finance</i>														
- 1986 - 2010	5	0	15	11	0	0	2	1	1	0	0		23	12
- 1947 - 2010	68		185		0		80		3		0		336	
<i>Journal of Financial Economics</i>														
- 1986 - 2010	2	0	11	6	2	0	0	0	3	0	2	1	20	7
- 1974 - 2010	2		11		2		1		3		2		21	
<i>Review of Financial Studies</i>														
- 1988 - 2010	8	0	63	13	0	0	7	4	9	1	5	2	92	20
Total 1986 - 2010	15	0	89	30	2	0	9	5	13	1	7	3	135	39

Real estate articles from the Journal of Finance, the Journal of Financial Economics, and the Review of Financial Studies that responded to one of the real estate related search terms are presented for the time period from 1986 to 2010 and for the whole time period of the two elder journals. The numbers of articles with a true real estate focus are displayed in the columns headed with “relev.”.

Table 5: Results for different real estate related search terms in titles and abstracts of the three top ranked finance journals

Journal	Year	Citations	Citat./Year	Key words	Title
RoFS	2009	241	120.50	m	Understanding the Subprime Mortgage Crisis
RoFS	2005	320	53.33	h	Portfolio Choice in the Presence of Housing
JoF	2005	252	42.00	h	Housing Collateral, Consumption Insurance, and Risk Premia: An Empirical Perspective
RoFS	2010	34	34.00	m, f	Optimal Mortgage Design
RoFS	2005	193	32.17	h	Optimal Consumption and Portfolio Choices with Risky Housing and Borrowing Constraints
JoFE	2010	32	32.00	m, f	Securitization and Distressed Loan Renegotiation: Evidence from the Subprime Mortgage Crisis
RoFS	2007	103	25.75	m, h	Money Illusion and Housing Frenzies
JoF	2007	85	21.25	m	Limits of Arbitrage: Theory and Evidence from the Mortgage-Backed Securities Market
JoFE	2010	19	19.00	m	Costly External Finance, Corporate Investment, and the Subprime Mortgage Credit Crisis
RoFS	1995	252	15.75	m	Rational Prepayment and the Valuation of Mortgage-Backed Securities
JoF	1989	313	14.23	m	Prepayment and the Valuation of Mortgage-Backed Securities
JoFE	2009	23	11.50	m	Mortgage Timing
JoF	2009	22	11.00	m	Securitization and the Declining Impact of Bank Finance on Loan Supply: Evidence from Mortgage...
RoFS	2009	20	10.00	m	Is the Market for Mortgage-Backed Securities a Market for Lemons?
JoF	1989	180	8.18	m	Valuing Commercial Mortgages: An Empirical Investigation of the Contingent-Claims Approach to Pricing...
RoFS	1997	78	5.57	m	Pricing Mortgage-Backed Securities in a Multifactor Interest Rate Environment: a Multivariate Density...
JoFE	2004	38	5.43	m	Banking Market Structure and Financial Stability: Evidence from the Texas Real Estate Crisis in the 1980s
JoF	2010	4	4.00	m	The Impact of Deregulation and Financial Innovation on Consumers: The Case of the Mortgage Market
JoF	1990	80	3.81	m	The Relative Termination Experience of Adjustable to Fixed-Rate Mortgages
JoF	1994	60	3.53	m	Rational Prepayments and the Valuation of Collateralized Mortgage Obligations
RoFS	2007	14	3.50	m	The Causal Effect of Mortgage Refinancing on Interest Rate Volatility: Empirical Evidence and Theoretical...
JoFE	2000	32	2.91	m	Making Markets for Structured Mortgage Derivatives
RoFS	2006	14	2.80	m, f	Theory and Evidence on the Resolution of Financial Distress
RoFS	1996	39	2.60	m	Mortgage Valuation under Optimal Prepayment
JoF	1994	43	2.53	m	Mortgage Redlining: Race, Risk, and Demand
JoF	1997	34	2.43	m	The Valuation of Complex Derivatives by Major Investment Firms: Empirical Evidence
RoFS	1989	52	2.36	m	Requiem for a Market: an Analysis of the Rise and Fall of a Financial Futures Contract
RoFS	2008	7	2.33	m	Monopoly and Information Advantage in the Residential Mortgage Market
JoFE	2009	4	2.00	m	Predatory Mortgage Lending
RoFS	2010	2	2.00	m, hp	Outstanding Debt and the Household Portfolio
JoF	1989	39	1.77	m	Adverse Selection in a Model of Real Estate Lending
JoF	1986	12	0.48	m	The Duration of an Adjustable-Rate Mortgage and the Impact of the Index
RoFS	2010	0	0.00	h	The Effects of Price Risk on Housing Demand: Empirical Evidence from U.S. Markets
RoFS	2010	0	0.00	m	Originator Performance, CMBS Structures, and the Risk of Commercial Mortgages

JoF = Journal of Finance, JoFE = Journal of Financial Economics, RoFS = Review of Financial Studies

f = foreclosure, h = housing, hp = household portfolio, m = mortgage

Articles from the Journal of Finance, the Journal of Financial Economics, and the Review of Financial Studies with a true focus on real estate are presented for the time period from 1986 to 2010. Moreover, citations per article are reported according to Google Scholar in October 2010.

Table 6: Real estate related articles in the three top ranked finance journals since 1986

1	2	3	4	5	6	7	8	9	10	11
No. Citations	Year	Journal	Title	Methodological Approach	Functional Aspects	Typological Aspects	Institut. & Strategic Aspects	Interdisciplinary Aspects	Key Words	
1	466	1998	JoREFE	A Generalized Spatial Two-Stage Least Squares Procedure for Estimating...	theoretical	(statistical)	-	-	-	spatial, predictability
2	261	1990	REE	Forecasting Prices and Excess Returns in the Housing Market	empirical	appraisal	residential	-	-	repeat s., indices, predictability
3	245	1992	REE	What Does the Stock Market Tell Us About Real Estate Returns?	empirical	investment	general	-	-	return, risk, portfolio, indices
4	231	1990	REE	Risk and Return on Real Estate: Evidence from Equity REITs	empirical	investment	general	-	-	return, risk, REIT
5	203	1989	REE	The Impacts of Borrowing Constraints on Homeownership	empirical	lending	residential	-	-	mortgage, imperfect markets
6	200	1998	JoREFE	Analysis of Spatial Autocorrelation in House Prices	empirical	appraisal	residential	-	-	hedonic, spatial, predictabil., return
7	198	1987	REE	The Cyclic Behavior of the National Office Market	empirical	investment	office	-	-	imperfect markets
8	196	1986	REE	Diversification Categories in Investment Real Estate	empirical	investment	commercial	-	-	portfolio
9	189	1993	JoRER	Estimating Market Values from Appraised Values without Assuming...	theoretical	investment	commercial	-	-	return, indices, imperfect markets
10	182	1991	JoREFE	Smoothing in Appraisal-Based Returns	theoretical	investment	commercial	-	-	return, risk, predictability
11	169	1992	JoREFE	The Predictability of Returns on Equity REITs and their Co-movement...	empirical	investment	general	-	-	portf., REIT, risk, return, predictabil.
12	168	1998	JoRER	The Predictability of Equity REIT Returns	empirical	investment	general	-	-	portfolio, return, REIT, predictability
13	165	1988	REE	The Duration of Marketing Time of Residential Housing	empirical	appraisal	residential	-	-	hedonic, imperfect markets
14	159	1995	REE	Price Discovery in American and British Property Markets	empirical	investment	commercial	-	-	return, REIT, indices, imperf.
15	148	1991	JoREFE	Risk and Return in Real Estate	empirical	investment	general	-	-	portfolio, return, REIT, risk, indices
16	147	1994	JoREFE	Value Indices of Commercial Real Estate: A Comparison of Index...	empirical	investment	commercial	-	-	return, REIT, risk, indices
17	143	2008	REE	The Long-Run Relationship Between House Prices and Rents	empirical	appraisal	residential	-	-	return, predictability
18	143	1991	REE	On Choosing Among House Price Index Methodologies	empirical	appraisal	residential	-	-	hedonic, repeat sales approach
19	141	1995	JoREFE	The Persistence of Real Estate Cycles	theoretical	investment	off., ind., res.	-	-	imperfect markets
20	140	2004	JoREFE	Spatial Statistics and Real Estate	descriptive	(statistical)	general	-	-	spatial
21	136	1992	JoREFE	Estimating Price Trends for Residential Property: A Comparison of Repeat...	empirical	appraisal	residential	-	-	repeat s., predictability
22	134	1989	REE	Estimating Real Estate's Systematic Risk from Aggregate Level Appraisal...	empirical	investment	commercial	-	-	risk, indices
23	133	1999	REE	Real Estate "Cycles": Some Fundamentals	theoretical	investment	res., comm.	-	-	imperfect markets
24	133	1997	JoREFE	The Construction of Residential Housing Price Indices: A Comparison of...	empirical	investment	residential	-	-	hedonic, repeat s., indices
25	130	1999	REE	The Integration of Commercial Real Estate Markets and Stock Markets	empirical	investment	commercial	-	-	return, REIT, imperfect markets

JoREFE = Journal of Real Estate Finance and Economics, REE = Real Estate Economics, JoRER = Journal of Real Estate Research, JoPR = Journal of Property Research

Table 7: Criteria-based evaluation of the 75 most cited articles (1986–2010, ranks 1 to 25)

1	2	3	4	5	6	7	8	9	10	11
#	No. Citations	Year	Journal	Title	Methodological Approach	Functional Aspects	Typological Aspects	Institut. & Strategic Aspects	Interdisciplinary Aspects	Key Words
26	125	1987	REE	Real Estate Returns and Inflation	empirical	investment	general	-	-	risk, portfolio
27	124	1997	JoREFE	Sample Selection Bias and Repeat-Sales Index Estimates	empirical	investment	residential	-	-	hedonic, repeat s., indices
28	119	1988	REE	Vacancy Rates and the Future of Office Rents	empirical	investment	office	-	-	predictability
29	117	1997	JoREFE	Consumption and Investment Motives and the Portfolio Choices of...	theoretical	investment	residential	-	-	portfolio, consumption
30	111	1993	JoREFE	The Single Family Home in the Investment Portfolio	empirical	investment	residential	-	-	portfolio, return, risk, repeat s.
31	108	1996	JoPR	Hedonic Modelling, Housing Submarkets and Residential Valuation	empirical	appraisal	residential	-	-	spatial, hedonic
32	107	2001	JoREFE	Valuing Open Space and Land-Use Patterns in Urban Watersheds	empirical	appraisal	residential	-	ecological	spatial, hedonic, sustainability
33	104	2002	JoREFE	Hedging Housing Risk	empirical	investment	residential	-	-	portfolio, return, risk, predictability
34	104	1986	REE	Risk and the Performance of Real Estate Investment Trusts...	empirical	investment	general	-	-	return, REIT, risk, indices
35	102	2003	JoREFE	Multi-Factor Cox-Ingersoll-Ross Models of the Term Structure...	(empirical)	(statistical)	general	-	-	(no reference to real estate)
36	102	1999	JoREFE	Why Don't We Know More About Housing Supply?	descriptive	(neutral)	general	-	-	imperfect markets
37	96	2000	JoREFE	Further Evidence on the Integration of REIT, Bond, and Stock Returns	empirical	investment	general	-	-	portfolio, REIT
38	95	1987	JoRER	Refining the Analysis of Regional Diversification for Income-Producing...	empirical	investment	general	-	-	portfolio
39	94	1995	REE	The Strategic Role of Listing Price in Marketing Real Estate: Theory and...	theo./emp.	appraisal	residential	-	-	imperfect markets, management
40	90	2004	JoREFE	Real Estate versus Financial Wealth in Consumption	empirical	investment	general	-	-	portfolio, consumption
41	87	1994	JoREFE	Race, Redlining, and Residential Mortgage Loan Performance	empirical	lending	residential	-	-	mortgage
42	85	1989	REE	Bias in Appraisal-Based Returns	theoretical	investment	general	-	-	imperfect markets, return
43	83	2003	REE	Controlling for the Impact of Variable Liquidity in Commercial Real Estate...	theo./emp.	investment	commercial	-	-	imperfect markets, portfolio, indices
44	82	2004	JoREFE	The Neighborhood Distribution of Subprime Mortgage Lending	empirical	lending	residential	-	-	subprime, mortgage, spatial
45	82	2003	JoREFE	The Trade-off between the Selling Price of Residential Properties and...	empirical	appraisal	residential	-	-	hedonic, imperfect markets
46	82	1990	REE	A Different Look at Commercial Real Estate Returns	empirical	investment	commercial	-	-	imperfect markets, return, risk
47	79	2005	REE	The Effect of Refinancing Costs and Market Imperfections on the Optimal...	theoretical	lending	residential	-	-	mortgage
48	78	1993	JoRER	Return Properties of Equity REITs, Common Stocks, and Commercial Real...	empirical	investment	commercial	-	-	REIT, return
49	77	2005	REE	An Empirical Test of a Two-Factor Mortgage Valuation Model: How Much...	empirical	lending	residential	-	-	mortgage
50	75	2001	JoREFE	Property-Value Impacts of an Environmental Disamenity: The Case of Landfills	empirical	appraisal	residential	-	ecological	predict., hedonic, sustainability

JoREFE = Journal of Real Estate Finance and Economics, REE = Real Estate Economics, JoRER = Journal of Real Estate Research, JoPR = Journal of Property Research

Table 7: Criteria-based evaluation of the 75 most cited articles (1986–2010, ranks 26 to 50)

1	2	3	4	5	6	7	8	9	10	11
#	No. Citations	Year	Journal	Title	Methodological Approach	Functional Aspects	Typological Aspects	Institut. & Strategic Aspects	Interdisciplinary Aspects	Key Words
51	74	2002	REE	Listing Price, Time on Market, and Ultimate Selling Price...	empirical	appraisal	residential	-	-	imperfect markets
52	74	1988	REE	A Note on the Use of Appraisal Data in Indexes of Performance...	theoretical	investment	general	-	-	imperf., return, portfolio, indices
53	73	1996	JoREFE	The Cultural Affinity Hypothesis and Mortgage Lending Decisions	empirical	lending	residential	-	social	mortgage, services, sustainability
54	70	2005	REE	The GSE Implicit Subsidy and the Value of Government Ambiguity	empirical	lending	general	-	-	imperfect markets, mortgage
55	70	1994	JoREFE	Bias in Estimates of Discrimination and Default in Mortgage Lending...	theoretical	lending	residential	-	-	mortgage
56	69	2001	JoREFE	The Use of Census Data for Hedonic Price Estimates of Open-Space...	empirical	appraisal	land	-	-	hedonic, spatial
57	68	2002	REE	Does Homeownership Affect Child Outcomes?	empirical	(neutral)	residential	-	social	sustainability
58	68	1996	REE	Rational Expectations, Market Fundamentals and Housing Price Volatility	empirical	investment	residential	-	-	imperfect markets, risk
59	67	2000	JoREFE	Debt, Agency, and Management Contracts in REITs: The External Advisor...	empirical	investment	general	CREM	-	REIT, management
60	64	2000	REE	Moral Hazard in Home Equity Conversion	theoretical	lending	residential	investors	-	risk, mortgage
61	45	1986	REE	The Incentive Effects of Flat-Fee and Percentage Commissions for Real...	theoretical	appraisal	general	service c.	-	services, management, imperf.
62	38	2006	REE	The Effect of Corporate Governance on Investment: Evidence from Real...	empirical	investment	general	CREM	-	REIT, management
63	29	2007	JoREFE	The Impact of Railway Stations on Residential and Commercial Property...	empirical	appraisal	res., comm.	-	-	hedonic, spatial
64	29	2006	JoRER	The Value of Foreclosed Property	empirical	appraisal	residential	-	-	repeat s., hedonic, imperf.
65	28	2007	JoREFE	Homeownership as a Constraint on Asset Allocation	theoretical	investment	residential	-	-	portfolio, consumption, imperf.
66	27	2006	JoREFE	Insider Ownership and Firm Value: Evidence from Real Estate Investment...	empirical	investment	general	CREM	-	REIT, management
67	25	2007	REE	Subprime Refinancing: Equity Extraction and Mortgage Termination	empirical	lending	residential	-	-	mortgage, subprime
68	24	2008	JoRER	The 1998–2005 Housing "Bubble" and the Current "Correction": What's...	empirical	appraisal	residential	-	-	subprime, imperf., predictability
69	20	2008	JoREFE	GSE Activity, FHA Feedback, and Implications for the Efficacy of the...	empirical	lending	residential	-	-	mortgage, subprime
70	15	2009	REE	House Price Changes and Idiosyncratic Risk: The Impact of Property...	empirical	appraisal	residential	-	-	imperfect markets
71	14	2009	JoREFE	Spillover Effects of Foreclosures on Neighborhood Property Values	empirical	appraisal	residential	-	-	subprime
72	13	2009	JoRER	An Empirical Test of a Contingent Claims Lease Valuation Model	empirical	appraisal	res., comm.	-	-	imperfect markets
73	11	2010	JoREFE	The Duration of Foreclosures in the Subprime Mortgage Market...	empirical	lending	residential	-	-	mortgage, subprime, risk
74	7	2010	JoREFE	Price-Volume Correlation in the Housing Market: Causality and...	empirical	appraisal	general	-	-	imperfect markets
75	4	2010	JoREFE	A Case for Percentage Commission Contracts: The Impact of a "Race"...	theoretical	appraisal	general	service c.	-	services, management, imperf.

JoREFE = Journal of Real Estate Finance and Economics, REE = Real Estate Economics, JoRER = Journal of Real Estate Research, JoPR = Journal of Property Research

Table 7: Criteria-based evaluation of the 75 most cited articles (1986–2010, ranks 51 to 75)

Key words:	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Total	
Overall:																											
- Imperfect market	1	1	2	2	1			1		3	1				3			1	2		1	1	1	1	2	2	26
Functional:																											
<i>Investment:</i>	2	3	2	2	2	2	2	3	1	2	1	3	1	2	2		1	1	1			2	1				36
- Return	1		1	1	2	2	2	3	1	1			1	1				1									17
- Portfolio	1	2	1			1	2	1					1		1	1		1	1	1			1	1			16
- Risk	1	1		1	2	2	2	1	1		1				1											1	14
- REIT	1				1	1	1	1	1	1					2		1					2					12
- Predictability			1		1	1	2							3			1	1						2			12
- Indices	1		1	1	1	1	1	1	1	1		2						1									12
- Consumption												1							1				1				3
<i>Appraisal:</i>	1		1		1	1	1				1	1	1			3	1	1				1	1	2	3	2	22
- Hedonic approach			1			1					1	2	2					2				1	1				12
- Spatial analysis											1		2				2		2				1				8
- Repeat sales approach					1	1	1	1				2										1					7
<i>Lending:</i>			1						2		1				1				1	3		1	1			1	12
- Mortgage			1						2		1				1				1	3		1	1			1	12
- Subprime																			1				1	2	1	1	6
Typological:																											
- Residential			1		1	1	1	1	2	2	3	3	1	1	1	2	3	1	1	2	1	3	3	3	1		38
- Commercial	1	1	1	1	1	1		2	1	2					2			1					1		1		16
- Industrial											1																1
- Unbuilt land																1											1
Institutional/Strategic:																											
- Management	1									1					2							2				1	7
- Services	1										1															1	3
Interdisciplinary:																											
- Sustainability											1					2	1										4

A key word analysis is undertaken on a yearly basis for the 75 real estate finance articles under consideration.

Table 8: Chronological key word analysis for the 75 most cited articles (1986–2010)

... together with:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Total:
Key word....																	
1 Imperfect market		6	3	2	2	1	4	3	2		1	3	1		2	1	31
2 Return	6		6	10	8	4	7				1						42
3 Portfolio	3	6		6	3	4	4	1		1	1					3	32
4 Risk	2	10	6		5	3	5		2		1		1				35
5 REIT	2	8	3	5		1	4					3					26
6 Predictability	1	4	4	3	1		1	3		2	2		1	1			23
7 Indices	4	7	4	5	4	1		2			3						30
8 Hedonic Approach	3		1			3	2			5	4			2	2		22
9 Mortgage	2			2						1			4	1	1		11
10 Spatial Analysis			1			2		5	1				1	1			11
11 Repeat sales approach	1	1	1	1		2	3	4									13
12 Management	3				3										2		8
13 Subprime	1			1		1			4	1							8
14 Sustainability						1		2	1	1					1		6
15 Services	2							2	1			2		1			8
16 Consumption	1		3														4
Total:	31	42	32	35	26	23	30	22	11	11	13	8	8	6	8	4	

Frequencies of key word combinations are presented for real estate finance articles under consideration.

Table 9: Key word combinations for the 75 most cited articles (1986–2010)

1				2				3				4				5			
Methodological Approach				Functional Aspects				Typological Aspects				Institut. & Strategic				Interdisciplinary			
	A1a	A1b	A2		A1a	A1b	A2		A1a	A1b	A2		A1a	A1b	A2		A1a	A1b	A2
empirical	51	57	52	appraisal	24	26	18	general	15	23	20	yes	1	3	6	yes	1	3	4
theoretical	16	8	15	investment	31	26	32	residential	34	37	35	no	66	64	61	no	66	64	63
descriptive	2	2	2	lending	9	11	12	commercial	18	7	13								
				other	3	4	5	other	2	2	2								

Table 10: Classification of the 67 most cited articles according to Alternatives 1a and 1b

No. articles:	1986-1990	1991-1995	1996-2000	2001-2005	2006-2010	Total
A1a: Total citations	12	22	23	10	0	67
A1b: Citations per year	1	8	16	23	19	67

Table 11: Distribution of the 67 most cited articles of Alternatives 1a and 1b, 1986 to 2010

No. citations:	1986-1990		1991-1995		1996-2000		2001-2005		2006-2010		Total no. cit.:
appraisal	1,570	27.12%	2,867	35.64%	3,696	37.55%	2,606	39.15%	987	40.32%	11,726
investment	2,959	51.11%	3,014	37.46%	3,421	34.76%	1,781	26.75%	898	36.68%	12,073
lending	910	15.72%	1,679	20.87%	1,319	13.40%	1,791	26.90%	352	14.38%	6,051
(not classified)	351	6.06%	485	6.03%	1,406	14.29%	479	7.20%	211	8.62%	2,932
Total	5,790	100.00%	8,045	100.00%	9,842	100.00%	6,657	100.00%	2,448	100.00%	32,782

Table 12: Total and relative numbers of citations for functional aspects in the 20 top cited articles per year of REE and JoREFE, 1986 to 2010

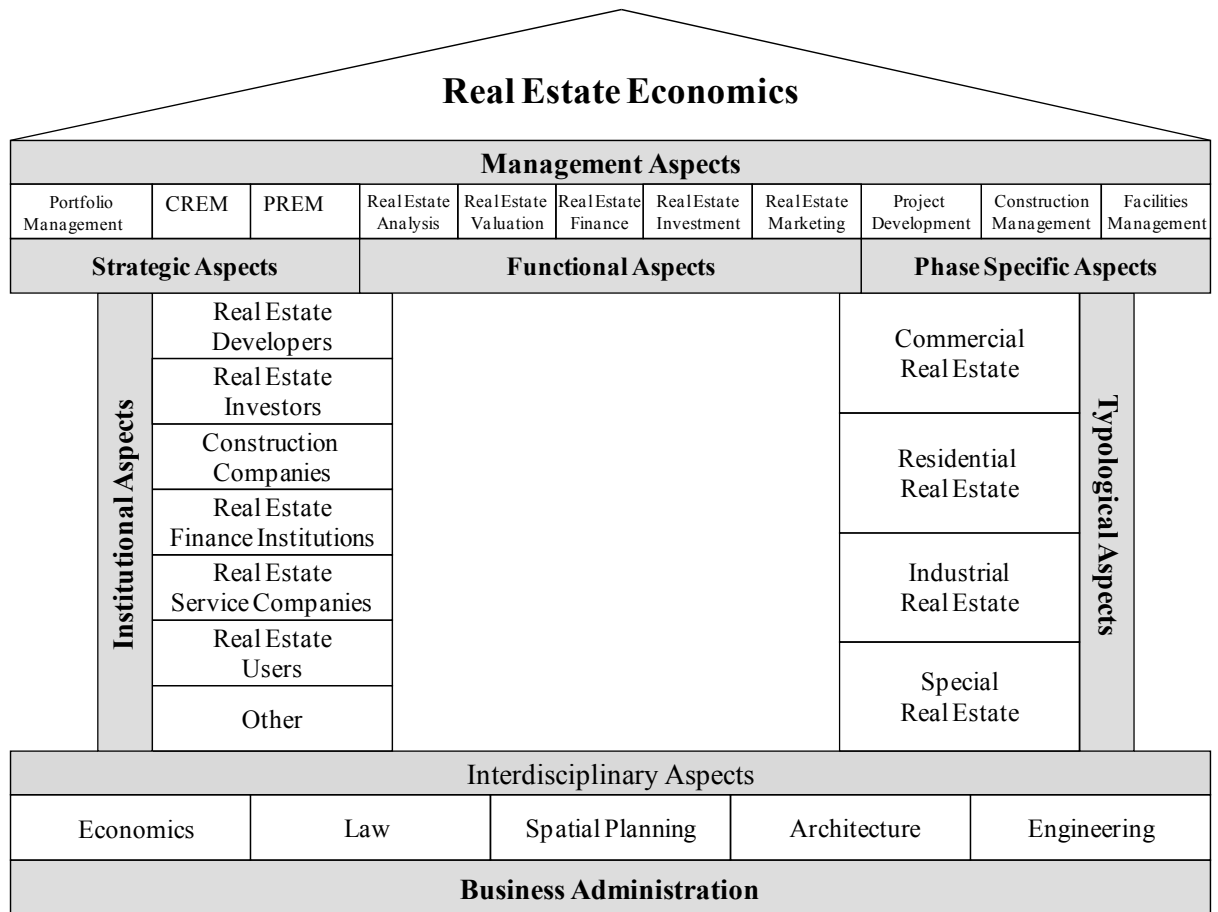


Figure 1: The “House of Real Estate Economics” according to Schulte (2003)

Special Features of Real Estate Assets leading toan Extension of Financial Management Theory	... Empirical Research Topics for Real Estate Finance
Tangibility	➡ Asset values and cash flows as income producing source	Financial Intermediation Theory; Property Rights Theory	Appraisal: Collateral values; Lending: Mortgage related products; Investment: Asset securitization
Indivisibility	➡ High investment volume; multiple funding sources	Modern Portfolio Theory; Capital Asset Pricing Model; Arbitrage Pricing Theory	Investment: - Risk-return predictability; - Overinvestment; - Asset securitization
Immobility	➡ Inflexibility on the supply side	(Theory of Land Economics) (Location Theory)	Appraisal: - Spatial analysis; - Pricing of social and environmental features
Heterogeneity and complexity	➡ Imperfect markets: - incomplete information - high transaction costs - market prices out of pairwise negotiations	Efficient Market Hypothesis; Capital Asset Pricing Model; Arbitrage Pricing Theory; Transaction Cost Theory; Agency Theory	Appraisal/Investment/Lending: - Detailed risk analysis Appraisal: - Different pricing techniques Investment: - Diversification to other assets Institutional aspects: - Incentive schemes for management, servicers

Figure 2: Specific features of real estate determining theoretical and empirical research topics

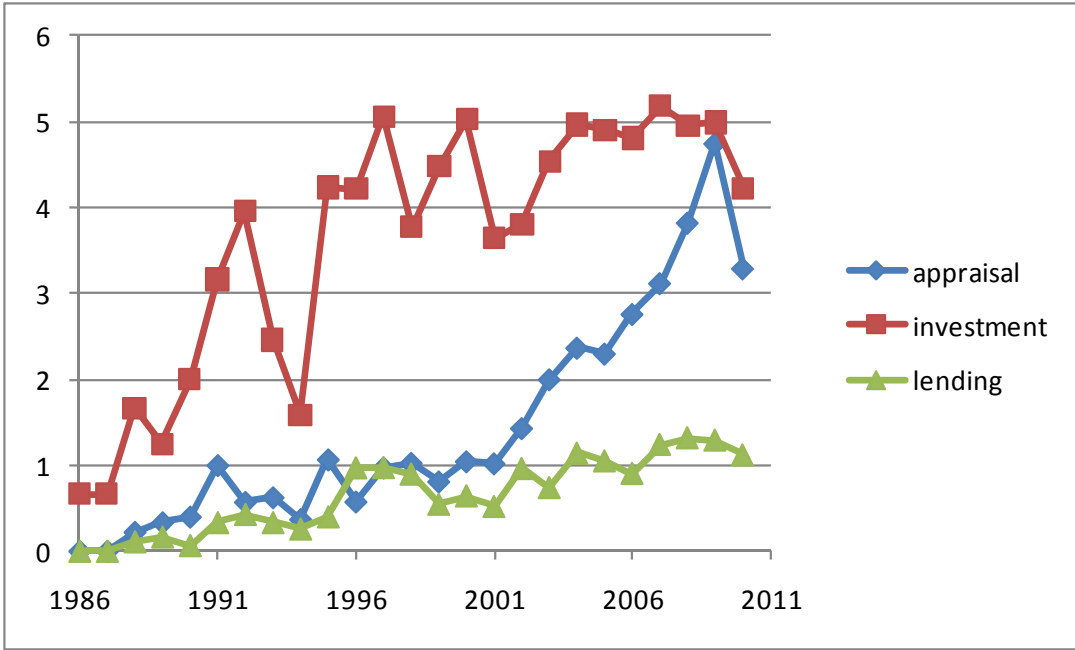


Figure 3 shows the aggregated numbers of citations for each of the three functional aspects, appraisal, investment, and lending, divided by the number of articles included in our analysis up to the respective year.

Figure 3: Evaluation of the importance of functional aspects in real estate on a yearly citation base

Interdisciplinary Approach	Multi-objective: - Sustainability indicators - Impact analysis - Ethical investments - Green buildings - ...	“Body of Knowledge”
	Financial Management Approach	Status quo
		empirical

The main focus of current research activities in real estate is shaded.

Figure 4: Actual and potential research fields in real estate