

Research in Real Estate, 1973-2010: A Three-Journal Comparison

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Abstract

This research compares *Real Estate Economics*, the *Journal of Real Estate Finance and Economics*, and the *Journal of Real Estate Research* in terms of their intellectual contribution to the real estate discipline. The 25 topics of real estate research identified by Winson-Geideman & Evangelopoulos (2012) are used as a basis for a comparison of topic emphases within the three journals. Findings show a shared group of topics, comprising the intellectual core of real estate research, as well as the specific thematic focus of each journal. Analysis of the dynamics in topic emphasis indicates a slow convergence of the three journals, suggesting that the discipline's maturation is accompanied by a process of scope clarification.

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Introduction

Studies of research in real estate have taken on a number of different issues since the publication of the first real estate journal in the early 1970s. Most are focused on assessing the quality of journals and institutions or the contributions of authors. Others have addressed the number of citations a given article or journal collects. While this body of research is quite thorough in its examination, the work on the relationship between the topical emphases of three core real estate journals is limited to a specific time period or to one or two journals. Only a few studies comprehensively address contents from the initial publication of the first real estate journal. This study attempts to fill that void by comparing the composition of the *Journal of Real Estate Research*, the *Journal of Real Estate Finance and Economics*, and *Real Estate Economics* to determine the topical emphasis of each journal, the topics that are shared among the three, and how the topical emphases have changed over time. Furthermore, our research finds that each journal displays distinct characteristics consistent with its mission that differentiates it from the others.

Background

Brief History of Real Estate Academic Organizations and Journals

The American Real Estate and Urban Economics Association (AREUEA), founded in 1964, was the first academic organization solely focused on real estate research and the promotion of the real estate discipline. Prior to that time the only forum for real estate education was the National

Association of Real Estate Boards (later the National Association of Realtors) education committee. Citing a need to distinguish real estate as a distinct academic discipline, the organization published the inaugural issue of the *AREUEA Journal*, devoted entirely to real estate-related topics, in 1973.¹ Thirteen years later in 1986, the American Real Estate Society, an organization focused on integrating industry and academic researchers, published the *Journal of Real Estate Research*. The emergence of these journals and the academic organizations that oversee them underscore the distinctiveness of real estate as a discipline separate from other social sciences. By 1988, a third journal devoted to real estate, the *Journal of Real Estate Finance and Economics*, began publication. These three journals, focused exclusively on real estate topics, are considered the "core" journals in the field (Dombrow and Turnbull, 2002).

A number of studies have verified the significance of the core journals to the real estate discipline. Citation counts (Redman, Manakyan, and Tanner, 1999 and 1998; Hardin, Liano and Chan, 2007a,b), author productivity (Urbancic, 2007; Dombrow and Turnbull, 2000; Clauretie and Daneshvary, 1993; Sa-Aadu and Shilling, 1988), and editorial board membership (Beauchamp, Hardin, Hill and Liano, 2008) have all been used. Faculty members within the discipline have been surveyed (Gibler and Zhou, 2010; Gibler and Ziobrowski, 2002; Diaz, Black and Rabianski, 1996) as have faculty in related fields such as finance (Webb and Albert, 1995). These studies generally rank *Real Estate Economics* as the top journal closely followed by the *Journal of Real Estate Finance and Economics* and the *Journal of Real Estate Research*.

¹ The *AREUEA Journal* was subject to two name changes, first to the *Journal of AREUEA* and then in 1995 to *Real Estate Economics*, as it is known today.

Topics in the Real Estate Discipline

Research addressing the topical emphases of the core real estate journals is typically limited to a non-comprehensive time period and/or to only one or two of the journals, with some exception. Furthermore, the literature is generally categorized based on the subjective judgment of one or two authors and without the use of any rigorous methodology. Jud (1996), for instance, analyzes articles published in the *Journal of Real Estate Research* between 1986 and 1994. Ten major topics are derived from 189 papers and include investment, appraisal, corporate real estate, housing values, brokerage, REITs, housing markets, regional, environment and mortgages. A study by Dombrow and Turnball (2004) evaluates papers published in the *Journal of Real Estate Finance and Economics* and *Real Estate Economics* between 1988 through 2001. Nine topics—appraisal, brokerage, housing, institutions, investments, mortgages, nonresidential, public policy and other—are developed along with three subsets of the sample period that are used to assess trends among the topics.

While these studies are important to the respective journals, they fail to synthesize the topical relationship among the journals and are thereby unable to assess trends within the discipline as a whole. Harrison and Manning (2008) attempt to address this by using a classification system derived from the *Journal of Real Estate Literature* to evaluate real estate articles published in 119 academic journals. The majority of the research (70%) falls into four broad categories—Real Estate Business/Industry, Type of Decision, Government Policy/Planning, and Type of Real Estate. The popularity of the topics over time is also analyzed and shows some variability, though nothing indicating an obvious trend.

Winson-Geideman and Evangelopoulos (2012) further address this issue in a topical assessment of the content of abstracts contained in the core journals. The authors use Latent Semantic Analysis, a quantitative approach that extracts real estate research topics as language patterns in 2,256 abstracts (editorials and book reviews excluded) published from 1973-2010. A series of topics, each describing a distinct category in real estate research, are developed. LSA is similar to factor analysis in that factors are derived by assessing commonalities within a collection of data. In this case the abstracts were reduced to a series of terms and documents loading on a specific factor, and the factors then were translated into 25 topics ranging from Research Methods and REITs to Appraisal and Corporate Real Estate. The authors also evaluate trends among the individual topics showing their relative popularity as measured by number of articles published each year over the time period analyzed.

Our study builds upon these results comparing the content of *Real Estate Economics*, the *Journal of Real Estate Finance and Economics*, and the *Journal of Real Estate Research* separately and jointly in terms of their intellectual contribution to the real estate discipline. In the sections that follow, the research methodology, results, and conclusions are presented.

Method

Data Collection

Article data were collected from the electronic library Business Source Complete through the EBSCO platform. All articles published in the *Journal of Real Estate Finance & Economics*, the *Journal of Real Estate Research*, and *Real Estate Economics* between 1973 and 2010 were initially considered. After excluding editorials and book reviews, 2,526 research articles were

identified. These included all featured research articles published in *JREFE* in the period 1988-2010, in *JRER* in the period 1986-2010, and in *REE* and its predecessors (*AREUEA Journal*, *Journal of the AREUEA*) in the period 1973-2010. Exhibit 1 presents summary article counts listed by journal and by decade. All article information was cross-checked with other electronic libraries for errors and omissions. The rest of our analysis focuses on the article abstracts, which were considered to be the best representation of the articles' research topics.

Exhibit 1
Article data included in our analysis

| Journal | Number of articles included | | | | Total |
|-------------------------------------------------------|-----------------------------|-----------|-----------|-----------|-------|
| | 1973-1980 | 1981-1990 | 1991-2000 | 2001-2010 | |
| <i>Journal of Real Estate Finance & Economics</i> | | 68 | 324 | 413 | 805 |
| <i>Journal of Real Estate Research</i> | | 117 | 404 | 227 | 748 |
| <i>Real Estate Economics</i> | 166 | 284 | 269 | 254 | 973 |
| Total | 166 | 469 | 997 | 894 | 2526 |

The article abstracts were analyzed through Latent Semantic Analysis, a text mining method that extracts concepts from observed patterns of word usage in a collection of documents. In preparation for this kind of analysis, our 2,526 abstracts were first converted into a tabulation of term occurrences, called the Vector Space Model (Salton 1975). This involves the compilation of a matrix where the documents (in our case, the abstracts) are the columns and all terms used in the collection of documents are the rows. To avoid the extraction of spurious language usage patterns, as well as computational inefficiencies, the set of terms under consideration was reduced by excluding trivial English words such as *the*, *and*, *of*, etc. Following standard text mining practices the terms were conflated through a process called term stemming, where, as an example, *lease*, *leased*, *leasing*, etc., were all represented by the stemmed term *leas-*.

The tabulation of term occurrences in our abstract collection started with a dimensionality of 3,644 rows, representing stemmed terms, and 2526 columns, representing the article abstracts. In order to promote low frequency terms and discount high frequency terms, term frequencies were transformed using a certain variant of the “term frequency-inverse document frequency” (TF-IDF) transformation, where the raw term frequency of term i in abstract j , tf_{ij} , is replaced by $w_{ij} = tf_{ij} * idf_i$, where $idf_i = \log_2(N/n_i)$, N is the total number of abstracts in the collection (here $N = 2526$), and n_i is the total frequency of term i in the entire collection of abstracts. The particular variant of the TF-IDF transformation has been shown empirically to be effective in representing relatively complex term co-occurrence patterns, such as those that one expects to observe in research abstracts.

Latent Semantic Analysis

The term frequency matrix \mathbf{A} , compiled as described in the previous sub-section, was analyzed using Latent Semantic Analysis (LSA), an analysis method for textual data capable of extracting socially constructed components of meaning (Deerwester et al. 1990, Landauer 2007). The factor analysis variant of LSA (Sidorova et al. 2008, Evangelopoulos et al. 2012) treats terms and documents as two sets of variables and extracts two corresponding sets of factor loadings, factor loadings for terms and factor loadings for documents. The varimax rotation procedure was applied on terms loadings, in order to reproduce the distinct factors that describe the intellectual content in real estate research using the given term vocabulary. Finally, the factor loadings for the 2,526 abstracts were also rotated using the same rotation matrix, so that terms and abstracts are represented in the same factor space. After repeating these steps for different numbers of

factors, a number of alternative factor solutions were produced. See Winson-Geideman & Evangelopoulos (2012) for a discussion of concept factors that describe real estate research at higher, as well as lower, levels of abstraction. Given the goal of the present paper, which is to obtain a set of research topics that can be used as attributes that facilitate journal comparison, we proceeded by selecting the rather detailed 25-factor solution. This is the same 25-factor solution as the one presented in Winson-Geideman & Evangelopoulos (2012). The resulting 25 research topics are presented in Exhibit 2. Technically, Exhibit 2 presents a list of 25 extracted LSA factors with the total count of corresponding high-loading abstracts, where “high” loadings were determined after examining the distribution of loadings and keeping the 2,526 highest values, so that the total number of high loadings equals the total number of abstracts in the collection. Essentially, Exhibit 2 presents a list of 25 topics in real estate research with the total count of related articles published in the three journals included in our study. The total article counts are further broken down to individual journal counts for *JREFE*, *JRER*, and *REE*. In the next subsection we use these individual journal counts in order to determine journal preference for various RE research topics.

Exhibit 2
Research topics in Real Estate (Winson-Geideman & Evangelopoulos 2012)

| Factor | Label | High-loading article count | | | |
|--------|--------------------------------------------------|----------------------------|--------------|-------------|------------|
| | | 3 journals | <i>JREFE</i> | <i>JRER</i> | <i>REE</i> |
| F25.1 | Research Methods | 195 | 71 | 60 | 64 |
| F25.2 | REITs | 193 | 71 | 60 | 62 |
| F25.3 | Brokerage and agency Portfolios, risk & asset | 119 | 33 | 45 | 41 |
| F25.4 | diversification | 138 | 36 | 59 | 43 |
| F25.5 | Mortgage termination options | 131 | 58 | 16 | 57 |
| F25.6 | Urban land | 134 | 45 | 42 | 47 |
| F25.7 | Default and foreclosure | 124 | 45 | 19 | 60 |
| F25.8 | Homeownership | 137 | 43 | 16 | 78 |
| F25.9 | Market integration/cointegration | 117 | 60 | 27 | 30 |
| F25.10 | Office property | 122 | 25 | 52 | 45 |
| F25.11 | Lending | 125 | 50 | 26 | 49 |
| F25.12 | Policies and regulation | 109 | 52 | 18 | 39 |
| F25.13 | Rent | 114 | 33 | 40 | 41 |
| F25.14 | Corporate real estate | 90 | 15 | 57 | 18 |
| F25.15 | Appraisal | 76 | 19 | 24 | 33 |
| F25.16 | Tax | 81 | 19 | 23 | 39 |
| F25.17 | Indices | 70 | 31 | 13 | 26 |
| F25.18 | Capital and leverage | 95 | 24 | 25 | 46 |
| F25.19 | Adjustable rate mortgages | 48 | 19 | 7 | 22 |
| F25.20 | Inflation | 63 | 15 | 15 | 33 |
| F25.21 | Brokerage industry | 69 | 15 | 39 | 15 |
| F25.22 | Journals, publications and authors | 40 | 12 | 17 | 11 |
| F25.23 | Retail | 45 | 10 | 30 | 5 |
| F25.24 | Auctions | 46 | 13 | 16 | 17 |
| F25.25 | Leases | 45 | 12 | 18 | 15 |
| | Total | 2526 | 826 | 764 | 936 |

An Algorithm for Journal Comparison

Drilling across the journal dimensions, we are able to observe some differences among journals.

Referring to Exhibit 2, even a simple visual examination of the article counts makes it obvious that *JRER*, with 57 out of 90 articles published, holds more than its fair share of articles on

Corporate Real Estate (F25.14). However, in order to quantitatively investigate the research topic preferences among the three journals, we devised an iterative consensus-building algorithm. Our algorithm attempts to unify the columns of a contingency table (in our case, the three journals) through a step-by-step elimination of rows (in our case, research topics) that contribute to column dependence. Since an optimal set of rows that achieve column independence while keeping the number of rows at a maximum is sought, the algorithm attempts to solve an optimization problem. As a full enumeration of all possible solutions in order to select the best may be overkill, our algorithm follows the “greedy” approach (see, e.g., Cormen, Leiserson, and Rivest, 1996), where a locally optimal choice is made at each iteration. The algorithm moves through the iterations in a backwards elimination fashion: it starts by considering the entire group of topics (rows) and proceeds to eliminate them one at a time, until the maximum set of equally favored topics is identified. Once topics are removed from the set, putting them back is not considered as an option, therefore our algorithm does not “backtrack”. The steps of the iterative algorithm are listed below in pseudo-code.

CONSENSUS-THROUGH-ATTRIBUTE-ELIMINATION($\mathbf{T}_{r \times c}$)

1. If $\sum(O_i - E_i)^2/E_i \leq \chi^2((r-1)(c-1), \alpha)$ then EXIT since a consensus is reached, else:
2. For rows $i = 1$ to r , compute the chi-square components $x_i = (O_i - E_i)^2/E_i$
3. Identify the most polarizing row $t = \operatorname{argmax}_i (x_i)$
4. Exclude row t from the contingency table $\mathbf{T}_{r \times c}$ and produce the reduced table $\mathbf{T}'_{r-1 \times c}$
5. Repeat iteratively by calling CONSENSUS-THROUGH-ATTRIBUTE-ELIMINATION($\mathbf{T}'_{r-1 \times c}$)

Note that the algorithm operates on a contingency table $\mathbf{T}_{r \times c}$, having r rows and c columns. The algorithm starts by computing the chi-square statistic for the test of independence of columns in the contingency table $\mathbf{T}_{r \times c}$. Step 1 examines whether the test is significant by comparing the calculated statistic to the critical chi-square value, using $(r-1)(c-1)$ degrees of freedom and a level of significance equal to α . If the test is not significant, the current set of rows constitutes a set of attributes that characterize the table columns in an equitable manner and the algorithm exits. If the chi-square test is significant, the row with the highest contribution to the chi-square statistic (most polarizing row) is identified in steps 2 and 3. At each iteration, the algorithm computes $x_i = (O_i - E_i)^2/E_i$ as the individual row contributions to the chi-square statistic. In our case, O_i refer to the observed article counts as they appear in Exhibit 2, and E_i to the corresponding expected counts under the null hypothesis of independence, which states that there are no differences in research topic preferences among journals. In step 4, the most polarizing row (in our case, research topic) is eliminated. The algorithm calls itself iteratively in step 5, using the reduced contingency table as its input.

Results

After compiling a contingency table that lists article counts for the 25 research topics and the three journals, as shown on Exhibit 2, the algorithm starts by eliminating the most polarizing topic. Polarizing propensity is measured as a row's contribution to the chi-square statistic for independence of the contingency table's rows and columns. Testing for independence of rows and columns, a chi-square value equal to 270.009 (df = 48, p-value < 0.0001) indicated a significant degree of dependence between topics and journals. Each topic's contribution to the chi-square statistic was calculated, pointing to corporate real estate (F25.14) as the most

polarizing topic with a chi-square contribution component equal to 46.717. This topic was then removed from the contingency table (iteration 1) and the independence of topics and journals was re-assessed iteratively. After 14 iterations, the 11 topics shown here were left in the contingency table. The expected article counts shown on this table are computed based on the null hypothesis of independence between topics and journals, as part of the chi-square test calculations at the 14th step of the iterative process. With a chi-square statistic equal to 24.49 (df = 20, p-value = 0.2216) a set of topics that are about equally distributed across the three journals is identified. After eliminating the most polarizing row, the chi-square statistic contributions of the remaining 24 rows in the updated contingency table are recomputed and a new most polarizing row is identified for elimination. The algorithm stops as soon as a contingency table produces an insignificant chi-square statistic, indicating that the remaining rows are equally distributed across the columns.

Exhibit 3 shows the topic-by-journal table after 14 elimination iterations, when 11 topics that are equally preferred by the three journals are identified. The topics are still listed in original order of descending explained variance as they appear in Exhibit 2. The 14 eliminated topics are organized into three groups: Topics favored by *JREFE*, shown on Exhibit 4, topics favored by *JRER*, shown on Exhibit 5, and those favored by *REE*, shown on Exhibit 6.

The 11 unifying topics shown in Exhibit 3 cover a variety of different topics of interest to the real estate discipline ranging from research methods to REITs to journals. The table shows a noticeable relationship between the expected and observed article counts for each topic with the *Urban Land* (F25.6) category one of the most distinct. For example, the observed article count

for *JREFE* in *Urban Land* is 45 and the expected 41.4. The observed count for *JRER* is 42 and expected 43.6, while the observed for *REE* is 47 and the expected 49.

We are pleased to see that the topics that are equally favored are so many, and that speaks to the maturity of the RE discipline. These are the topics that constitute the “foundation” of real estate research, that is, those topics that are considered important to the discipline, regardless of source. They are both applied and theoretical, representing topics in finance (*REITs*, F25.2 and *Capital and Leverage*, F25.18), law (*Brokerage and Agency*, F25.3 and *Leases* (F25.25) and statistics (*Research Methods*, F25.1). The remaining topics could be loosely categorized as “pure” real estate topics, i.e. those topics of primary relevance to the real estate from industry, ownership, and investment perspectives. It is important to note, however, that the amount of published papers representing a given topic is not necessarily indicative of the relative importance of that topic to the discipline. It may be a function of data availability or reflect the preferences of the journal editors, among other possibilities.

Exhibit 3
Unifying topics

| Factor | Topic | Observed article counts | | | Expected article counts | | |
|--------|-------------------------------|-------------------------|-------------|------------|-------------------------|-------------|------------|
| | | <i>JREFE</i> | <i>JRER</i> | <i>REE</i> | <i>JREFE</i> | <i>JRER</i> | <i>REE</i> |
| F25.1 | Research Methods | 71 | 60 | 64 | 60.3 | 63.4 | 71.3 |
| F25.2 | REITs | 71 | 60 | 62 | 59.7 | 62.8 | 70.6 |
| F25.3 | Brokerage and agency | 33 | 45 | 41 | 36.8 | 38.7 | 43.5 |
| F25.6 | Urban land | 45 | 42 | 47 | 41.4 | 43.6 | 49.0 |
| F25.13 | Rent | 33 | 40 | 41 | 35.3 | 37.1 | 41.7 |
| F25.15 | Appraisal | 19 | 24 | 33 | 23.5 | 24.7 | 27.8 |
| F25.16 | Tax | 19 | 23 | 39 | 25.1 | 26.3 | 29.6 |
| F25.18 | Capital and leverage | 24 | 25 | 46 | 29.4 | 30.9 | 34.7 |
| F25.22 | Journals/publications/authors | 12 | 17 | 11 | 12.4 | 13.0 | 14.6 |
| F25.24 | Auctions | 13 | 16 | 17 | 14.2 | 15.0 | 16.8 |
| F25.25 | Leases | 12 | 18 | 15 | 13.9 | 14.6 | 16.4 |

Notes: The 11 topics shown here are the result of the consensus building algorithm after the 14th iteration. The expected article counts shown on this table are computed based on the null hypothesis of independence between topics and journals, as part of the chi-square test calculations at the 14th round of the iterative process. With a chi-square statistic equal to 24.49 (df = 20, p-value = 0.2216) a set of topics that are about equally distributed across the three journals is now identified.

Even though real estate has evolved as a distinct discipline with many similarities among its top journals, each of the three journals evaluated possesses a specific set of characteristics based on topic preference that distinguishes it from the other two (Exhibits 4-6). As its name suggests, the *Journal of Real Estate Finance and Economics*, for instance, shows a distinct preference for topics related to finance such as mortgage termination options, market integration/co-integration, default and foreclosure, lending, and ARMs (Exhibit 4). Furthermore, because pricing indices and policy have a close and direct relationship with finance it is not surprising that those two topics are preferred as well. The observed article counts on these topics are much higher for

JREFE than the expected article counts. By comparison, *JRER* shows much lower article counts than expected.

Exhibit 4
Research topics that are favored by *JREFE*

| Factor | Topic | Observed article counts | | | Expected article counts | | |
|--------|-----------------------------------|-------------------------|-------------|------------|-------------------------|-------------|------------|
| | | <i>JREFE</i> | <i>JRER</i> | <i>REE</i> | <i>JREFE</i> | <i>JRER</i> | <i>REE</i> |
| F25.5 | Mortgage termination options | 58 | 16 | 57 | 44.5 | 37.3 | 49.2 |
| F25.9 | Market integration/co-integration | 60 | 27 | 30 | 39.0 | 34.5 | 43.5 |
| F25.12 | Policies and regulation | 52 | 18 | 39 | 35.2 | 32.6 | 41.2 |
| F25.7 | Default and foreclosure | 45 | 19 | 60 | 38.9 | 38.1 | 47.1 |
| F25.17 | Indices | 31 | 13 | 26 | 22.6 | 20.9 | 26.5 |
| F25.11 | Lending | 50 | 26 | 49 | 39.7 | 38.0 | 47.3 |
| F25.19 | Adjustable rate mortgages | 19 | 7 | 22 | 14.8 | 15.1 | 18.1 |

Notes: Refer to the notes in Exhibit 3, where 11 topics that are equally favored by the three journals are listed. Out of the 14 topics that were removed from Exhibit 3, the 7 that are favored by *JREFE* are listed here. The observed article counts are the original figures listed in Exhibit 2. The expected article counts, however, correspond to different steps of the iterative algorithm that eliminates polarizing topics from the contingency table in a backward elimination fashion. The criterion for listing a topic as "favored by *JREFE*" is having an observed article count in *JREFE* that is larger than the corresponding expected article count. The 7 topics listed here have observed counts that exceed the counts expected under the independence assumption by percentages that range between 15.8% and 53.8%.

Exhibit 5 suggests that the *Journal of Real Estate Research* tends to focus on topics that delineate real estate as a business (*Corporate Real Estate, Brokerage Industry*) and as an asset class (*Retail, Office Property, and Portfolios, Risk and Asset Diversification*). Recall that *JRER* was published with the original intent of integrating real estate academics with industry research practitioners, and it appears from this analysis the journal has not deviated from that focus. Further, none of the five topics that are favored by *JRER* cross-list with *JREFE* or *REE*, so it seems that *JRER* follows a distinct topic preference strategy.

The results for *Real Estate Economics* show the journal has a strong propensity toward research on homeownership and finance (Exhibit 6). Four out of the six topics favored by *REE* crosslist with *JREFE* favorites, thus it seems as if *REE* and *JREFE* have aligned their topic preference strategies. While this appears true initially, it is more likely that *JREFE* focuses on a broad range of finance papers while *REE* focuses on finance issues directly related to homeownership. The finance topics that are included (mortgage termination options, default and foreclosure, lending, adjustable rate mortgages and inflation) are all closely tied to the homeownership decision thus giving *Real Estate Economics* the distinction of favoring topics that appeal to home buyers. This focus may be rooted in the origins of AREUEA as its founding members were originally members of the National Association of Real Estate Boards.

Exhibit 5
Research topics that are favored by *JRER*

| Factor | Topic | Observed article counts | | | Expected article counts | | |
|--------|------------------------------------------|-------------------------|-------------|------------|-------------------------|-------------|------------|
| | | <i>JREFE</i> | <i>JRER</i> | <i>REE</i> | <i>JREFE</i> | <i>JRER</i> | <i>REE</i> |
| F25.14 | Corporate real estate | 15 | 57 | 18 | 29.4 | 27.2 | 33.3 |
| F25.23 | Retail | 10 | 30 | 5 | 15.0 | 13.5 | 16.4 |
| F25.21 | Brokerage industry | 15 | 39 | 15 | 23.2 | 20.2 | 25.6 |
| F25.10 | Office property | 25 | 52 | 45 | 37.8 | 38.8 | 45.4 |
| F25.4 | Portfolios, risk & asset diversification | 36 | 59 | 43 | 43.9 | 42.7 | 51.4 |

Notes: Refer to the notes in Exhibits 3 and 4. Out of the 14 topics that were removed from Exhibit 3, the 5 that are favored by *JRER* are listed here. The criterion for listing a topic as "favored by *JRER*" is having an observed article count in *JRER* that is larger than the corresponding expected article count. The 5 topics listed here have observed counts that exceed the counts expected under the independence assumption by percentages that range between 34% and 121.8%.

Exhibit 6
Research topics that are favored by *REE*

| Factor | Topic | Observed article counts | | | Expected article counts | | |
|--------|------------------------------|-------------------------|-------------|------------|-------------------------|-------------|------------|
| | | <i>JREFE</i> | <i>JRER</i> | <i>REE</i> | <i>JREFE</i> | <i>JRER</i> | <i>REE</i> |
| F25.8 | Homeownership | 43 | 16 | 78 | 45.6 | 39.8 | 51.6 |
| F25.5 | Mortgage termination options | 58 | 16 | 57 | 44.5 | 37.3 | 49.2 |
| F25.7 | Default and foreclosure | 45 | 19 | 60 | 38.9 | 38.1 | 47.1 |
| F25.11 | Lending | 50 | 26 | 49 | 39.7 | 38.0 | 47.3 |
| F25.19 | Adjustable rate mortgages | 19 | 7 | 22 | 14.8 | 15.1 | 18.1 |
| F25.20 | Inflation | 15 | 15 | 33 | 19.3 | 20.2 | 23.6 |

Notes: Refer to the notes in Exhibits 3 and 4. Out of the 14 topics that were removed from Exhibit 3, the 6 that are favored by *REE* are listed here. The criterion for listing a topic as "favored by *REE*" is having an observed article count in *REE* that is larger than the corresponding expected article count. The 6 topics listed here have observed counts that exceed the counts expected under the independence assumption by percentages that range between 3.6% and 51.1%.

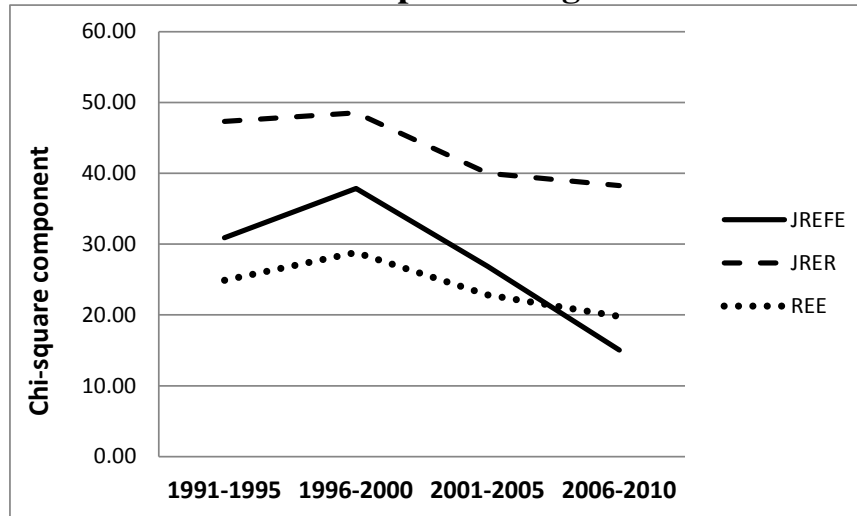
To complete our comparison among the three journals, we also performed a longitudinal assessment of each journal's topical composition. We reproduced four versions of Exhibit 2, showing the number of high-loading articles organized by topic and by journal, for the 5-year periods 1991-1995, 1996-2000, 2001-2005, and 2006-2010. For each of the four tabulations, we computed the chi-square statistic for the test of independence between topics and journals, similar to what was done in Exhibits 3-6. Exhibit 7 summarizes the total chi-square statistic for the four time periods and also breaks it down by individual journal component. Overall, the three journals have moved from a chi-square value of 103.08 (1991-1995) to 73.10 (2006-2010), indicating a general pattern of convergence over time.

Exhibit 7
Chi-square components for journal-topic convergence

| Period | chi-square statistic | | | |
|-----------|----------------------------|-------|-------|-------|
| | Total value (significance) | JREFE | JRER | REE |
| 1991-1995 | 103.08 (<0.001) | 30.89 | 47.31 | 24.88 |
| 1996-2000 | 115.22 (<0.001) | 37.87 | 48.52 | 28.83 |
| 2001-2005 | 89.65 (<0.001) | 26.84 | 39.98 | 22.83 |
| 2006-2010 | 73.10 (0.011) | 15.03 | 38.28 | 19.79 |

Exhibit 8 graphically presents the same information shown in Exhibit 7, focusing on the individual components of the three journals. All three appear to have moved closer over time, with the exception of the 1996-2000 period. Movement towards convergence or divergence may relate to the journals' efforts to differentiate, to editorial efforts for quality improvement, or to the maturation of the real estate discipline. For example, our analysis suggests that the commonly accepted increased quality perception of JRER over the past 10 years coincides with the journal embracing more readily accepted topics. Furthermore, JRER's move towards convergence after 2000 may be associated with certain strategic directions taken under the leadership of Ko Wang, who has been serving as the sole JRER editor since 1999.

Exhibit 8
Journal-topic convergence



Conclusion

This research compares the body of research published in three core real estate journals, *Real Estate Economics*, the *Journal of Real Estate Finance and Economics*, and the *Journal of Real Estate Research*. The 25 research topics extracted by Winson-Geideman and Evangelopoulos (2012) through Latent Semantic Analysis are used as the basis for this comparison. Themes within each of the core journals are identified, showing that each has a specific focus consistent with its mission. The *Journal of Real Estate Finance and Economics* appears to focus on finance, preferring topics such as mortgage termination options, market integration/co-integration, default and foreclosure, lending, and ARMs. Some of these topics are also preferred by *Real Estate Economics* although REE appears to emphasize those that are directly related to the homeownership decision (homeownership, mortgage termination options, default and foreclosure, lending, adjustable rate mortgages and inflation). The *Journal of Real Estate Research* follows a distinct set of topics, including corporate real estate, brokerage, retail, office

and real estate portfolios. Furthermore, a set of eleven topics is shared among the journals, constituting the foundation of real estate research. These eleven topics include research methods, REITs, brokerage, urban land, rent, appraisal, taxes, capital and leverage, real estate publications, auctions and leases.

We recognize that our analysis has some limitations as there are a number of factors that may influence the topical structure of real estate publications. First of all, some topics may receive minimal coverage in top, peer-reviewed journals because the data necessary to produce meaningful research may not be readily available. Conversely, data for other topics (such as REITs) may be easily acquired, resulting in a large number of high-quality papers. Furthermore, it is possible that tenure and promotion requirements may influence the direction of research as authors pursue topics with the greatest potential for publication in top journals or that the more heavily favored topics reflect the preferences of journal editors. Future research could investigate these issues.

The primary value of this manuscript is in the identification of sets of topics preferred by each journal's editor and editorial board. This may help guide authors choosing outlets for their research and/or topics with the greatest likelihood of publication. In sum, this study contributes to the ongoing discussion about the body of research within the top real estate journals and their contribution to the discipline.

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