External Appraisal, Auditing, and Information Asymmetries in the Real Estate Industry: European Evidence

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Juha Mäki

Abstract

This paper investigates whether the use of external investment property appraisers or the adoption of Big 4 auditors reduces information asymmetry across market participants in the real estate industry. The study exploits the annual reports of publicly traded real estate firms in the European Union over the period 2007–2016. The information asymmetry measures used are the firm's percentage bid-ask spread and the standard deviation of analyst recommendations. The results suggest that firms that adopt an external property valuation trigger less information asymmetries among investors than companies that use internal valuation processes. In a similar vein, the findings indicate that the adoption of a Big 4 auditor reduces bid-ask spreads in the real estate industry.

Keywords:

information asymmetry, external appraisal of investment property, Big 4, IFRS

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1. Introduction

This study investigates whether the use of external investment property appraisers or Big 4 auditors by real estate companies reduces information asymmetry across market participants when financial statements are made under IAS 40 (International Accounting Standards, Investment Property). The literature has addressed two high-level specialists, asset appraisers and Big 4 auditors, in a different way. While previous studies have examined the effect of the auditor on information asymmetry (e.g., Hakim & Omri, 2010; Lawrence, Minutti-Meza, & Zhang, 2011), the role of the external appraisal has been largely neglected in the literature.

The implementation of IAS 40 offers an interesting opportunity to examine whether the adoption of the fair value method potentially affects the quality of financial reporting and information asymmetries. This study focuses on the real estate industry and uses the annual reports of publicly traded real estate companies in the European Union over the period from 2007 to 2016.

In recent decades, one of the most investigated topics in accounting research has been information asymmetries and the consequences of these asymmetries for investors and other stakeholders of the firm. Financial reporting is important for the functioning of an efficient capital market, and interested parties obtain information via financial reports (e.g., financial statements, management reports, and reports of audit committees) in addition to other information sources and disclosure such as voluntary management forecasts, press releases, and analysts' forecasts. Hence, investors may use both regulated and unregulated information to support their decision-making.

Accounting information has two significant roles in the economy. First, it allows capital providers (shareholders and creditors) to evaluate the prospects of the firm. Second, accounting information allows capital providers to monitor the use of their committed capital (Beyer, Cohen, Lys, & Walther, 2010). Theoretical accounting research (e.g., DeAngelo, 1981) shows that quality differences should occur across different types of external monitors. The study of Dietrich, Harris, and Muller (2000) finds support for this theory within the UK investment property sector. They document that external property appraisals are less biased and produce more accurate estimates for market prices than internal appraisals. The need for accounting information produced by outsiders ("third parties") occurs because managers typically have more exact information about the expected financial status of the company. This information asymmetry may cause the outside stakeholders to make wrong financial decisions because insiders may have their own incentives (Beyer et al., 2010).

The European Parliament and the Council required public companies to apply the International Financial Reporting Standards (IFRS) from the fiscal year 2005 onwards. The international accounting standard (IAS) 40 permits companies to use two alternative ways to valuate investment properties: cost and revaluation. However, IAS 40 requires companies using the cost model to disclose the fair value of investment property in the notes (Muller, Riedl, & Sellhorn, 2011). Since the beginning of 2013, real estate companies have followed the IFRS 13 (Fair Value Measurement) standard, which provides a framework for measuring fair value and reporting on fair value measurement (IASB, 2018).

The mandatory adoption of the IFRS is relevant for both investors and managers. There are relatively few studies on the interactions of management with company specialists such as appraisers and auditors (Messier, 2018) who can play a considerable role in a process of producing financial statements. Especially in real estate companies, where the valuation of investment properties is marked by so many uncertain factors, the type of specialist employed by

companies is important. This study adds to the debate on fair value accounting by documenting that the choice of high-level specialists (appraisers or auditors) can reduce information asymmetry differences across companies.

This paper investigates whether the level of information asymmetry is related to the type of appraisal of investment properties, or the auditing firms involved. The information asymmetry measures used in the empirical analysis are the firm's stock price bid-ask spread and the standard deviation of analyst recommendations.

The empirical tests provide evidence that information asymmetry is affected by the choice of the form of investment property appraisal. The use of internal appraisals increases information asymmetries. The difference is most clearly seen in comparison to firms that use large, well-known external appraisers. Also, the adoption of a Big 4 auditor is documented to decrease information asymmetries in the real estate industry.

The main contribution of this paper is to establish that appraisals of investment property conducted either by large, well-known or other external appraisal firms have a similar effect in terms of reducing information asymmetry, but the effect is stronger in the case of more well-known appraisal firms. The empirical findings contribute to the debate over the recognition of fair value estimates for investment properties by demonstrating that monitoring by external experts such as appraisers and auditors can decrease information asymmetries.

The remainder of the paper is organized as follows. Section 2 discusses the prior literature and presents the hypotheses. Section 3 introduces the methodology used to measure information asymmetry and describes the data used in the study. Section 4 presents the empirical results and Section 5 concludes.

2. Prior literature and hypotheses

Information asymmetry among corporate stakeholders appears when some of them have private information about the firm's value and business predictions while other less-informed stakeholders depend only on public information. Healy, Hutton, and Palepu (1999) find that there is a negative connection between disclosure quality and the bid-ask-based measurement of information asymmetry (normally calculated as the average amounts over the fourth months after the end of the fiscal year). In other words, the quality of a firm's disclosure is related to the average level of information asymmetry among equity investors (e.g., Daske, 2006; Li, 2010; He, Lepone, & Leung, 2013). This asymmetry leads to an imbalance of knowledge in transactions, which can sometimes cause a significant distraction in the market. Almost all transactions have at least some amount of information asymmetry.

Lang and Lundholm (1993) document that companies that produce financial reporting on the basis of quality information have more accurate earnings forecasts, a larger group of analysts following them, and less deviation between the analysts' forecasts. This suggests that a more informative reporting policy reduces information asymmetry. Lang and Lundholm (1993) also show that the issue of information asymmetry can differ for investors and managers. Managers having access to performance information can foster even greater information asymmetry. For example, Francis and Wang (2008) and Roychowdhury, Shroff, and Verdi (2019) suggest that a high-quality reporting policy reduces information asymmetry between the firm's various stakeholders. Glosten and Milgrom (1985) develop a model to establish that information asymmetry within a firm increases when the amount and quality of financial reporting decrease.

Brown and Hillegeist (2007) offer two main reasons for the negative association between

information asymmetry and financial reporting quality: Although information asymmetry is positively associated with the absolute amount of trading by uninformed and informed traders, it is negatively associated with the relative amount of informed trading and is negatively associated with the frequency with which informed investors discover and trade on private information. Byard and Shaw (2003) conclude that analysts use publicly available financial data more than they rely on liaisons with the management of their client companies. Property valuations with sensitivity analyses, for instance, are more valuable when analysts produce the relevant forecasts (Laakso, 2017).

Kim and Verrecchia (1994) document that bid-ask spreads may increase around earnings announcements when information asymmetry between informed and less-informed market-makers increases. Some market-makers try to protect themselves by manipulating quoted bid and ask prices and the quoted depths associated with those prices in the presence of a great deal of noisy information. Kim and Verrecchia (1994) highlight that a contrast between earnings announcements and management earnings forecasts versus analyst earnings forecasts is temporary. According to their findings, all three information release types lead to a reduction in information asymmetry after the short-window announcement period.

Amiram, Owens, and Rozenbaum (2016) report that an analyst forecast is an information release by a well-informed producer who processes public and private information. Overall, financial analysts are often considered to proxy for well-informed stakeholders in the capital markets (e.g., Allee, Bhattacharya, Black, & Christensen, 2007; Ramnath, Rock, & Shane, 2008). In other words, information from analyst forecasts—unlike information from earnings announcements and management forecasts—will be new only to unsophisticated investors (Amiram et al., 2016). While both earnings announcements and management forecasts increase information asymmetry within the announcement, analyst forecasts have the opposite effect. Nevertheless, only a very small proportion of investors consider that information useful (Brown, Call, Clement, & Sharp, 2015). Kadan, Michaely, and Moulton (2014) report evidence suggesting that sophisticated investors may get information from analysts before an announcement because institutions trade before analyst information is released, while unsophisticated investors mostly trade after such releases.

The earnings forecasts of analysts are more precise than time-series models of earnings because analysts are able to monitor companies and economic news affecting their forecasts more intensively than is possible with time-series models (e.g., Fried & Givoly, 1982). Moreover, analysts' earnings forecasts and recommendations affect stock prices (e.g., Francis & Soffer, 1997). Early studies on bias indicated that analysts' earnings forecasts tended to be optimistic and that their recommendations too often favored buys (Brown, Foster, & Noreen, 1985), albeit recent research shows a change in that level of optimism of analysts' earnings forecasts (e.g., Matsumoto, 2000).

Hodgdon, Tondkar, Harless, and Adhikari (2008) suggest that the adoption of the IFRS reduces information asymmetry and makes it easier for analysts to produce more precise forecasts. In the European context, Jiao, Koning, Mertens, and Roosenboom (2012) argue that forecasts have become more precise since the adoption of the IFRS. At the same time, the dispersion of forecasts seems to decrease.

Financial reporting made under the IFRS standards and strict regulation is more informative and reduces information asymmetry (Healy & Palepu, 2001; Houqe, 2018). Conaway, Liang, & Riedl (2018) study the likelihood of US adoption of fair value reporting for investment properties and find a significantly positive market reaction to fair value reporting. The standard

provides a hierarchy of methods for arriving at the fair value: Level 1; unadjusted quoted prices for identical assets and liabilities in active markets (preferable), Level 2; other observable inputs for the asset or liability such as quoted prices in active markets for similar assets or liabilities or quoted prices for identical assets or liabilities in markets which are not active, and Level 3; unobservable inputs to the asset or liability (IASB, 2018).

The study of Muller & Riedl (2002) indicates that in the UK the use of external appraisals in the valuation of investment properties affects the level of information asymmetry. On the other hand, they did not find a significant connection between information asymmetry and Big 6 auditors. Overall, earlier studies offer somewhat contradictory results on the relation between information asymmetry and auditing by the Big 4 audit firms. Hakim et al. (2010), for instance, argue that the bid-ask spread is lower for companies audited by the Big 4. Lawrence et al. (2011) suggest that differences in proxies between Big 4 and non-Big 4 auditors largely reflect client characteristics such as the size of a company. This last study suggests that propensity score matching (PSM) on client characteristics eliminates the Big 4 effect. A recent study by DeFond, Erkens, and Zhang (2016) suggests that this result may be affected by PSM's sensitivity to its design choices and by the validity of the audit quality measures. The study concludes that it is too early to suggest that PSM eliminates the Big 4 effect.

Almutairi, Dunn, and Skantz (2009) argued that a high-quality audit reduces information asymmetry and increases the amount of special information for investors. Dunn and Mayhew (2004), for example, find that high-quality auditing decreases information asymmetry in an open market situation. La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1998) found different legal and enforcement qualities among the countries included in their sample; in Europe, the UK generally has the strongest legal protection for investors, and Central European civil law countries the weakest, with Germany and the Scandinavian countries located in the middle.

Under IAS 40.75, firms' annual reports must document the extent to which the fair value allocated to investment property is based on a valuation by a qualified independent appraiser. Property valuation can also be an internal process. Nellessen and Zuelch (2010), for example, argue that there is understandable doubt that fair values can be imprecise. They argue that the process of how investment property fair values are derived is unclear and the reliability of real estate appraisals within stakeholders is low. They show that the human nature of the appraiser, the process itself, the incentives of appraisers, auditors, and managers, such as litigation risk or conservatism, likewise the property market situation increases the likelihood of biased fair values (e.g., Liu & Elayan, 2015). That can be one reason why Muller et al. (2002) report that the use of external appraisals affects the level of information asymmetry in the UK.

Given the background discussed above, this paper proposes the following hypotheses:

H_1: External appraisal of investment properties decreases informational asymmetries in the real estate industry.

H_2: The adoption of either a specialist external property appraisal firm or a Big 4 audit firm has a similar decreasing effect on information asymmetries in the real estate industry.

3. Methodology and data

3.1 Real estate companies and information asymmetry

The European Union has a commercial real estate market value of approximately EUR 6.5 trillion (2017). The value of the listed real estate companies is estimated at EUR 350 billion (EPRA, 2017). The number of EPRA (European Public Real Estate Association) member companies in Europe was 104 at the end of 2017. The main investment properties consist of office buildings, shopping centers, and industrial buildings. Real estate companies purchase, lease, develop, sell, and manage investment property to generate profit through rents or transactions.

The business of the real estate industry under IAS 40 (and IFRS 13) has some specific features: a long-life cycle for properties, considerable uncertainty over the values of real estate portfolios (see Level 2 and Level 3 above), and a notable significance of the chosen valuation procedure to both the income statement and balance sheet.

3.2 Methodology development

The information asymmetry of accounting has been measured in several ways. It has been proxied by the stock price bid-ask spread, dispersion or standard deviation of analyst forecasts, the number of analysts monitoring companies, forecast errors, the proportion of intangible assets in company value, the probability of the informed trading measure (Eastley, Hvidkjaer, & O'Hara, 2002), the drop in stock price at the moment of an IPO, the lack of information on planned changes in R&D budgets, and even a lack of liquidity. The degree of information asymmetry is not directly observable, and therefore, empirical studies rely on proxy variables (Healy et al., 2001). For the same reason, it is difficult to empirically test the adequacy of the alternative proxies.

The stock price bid-ask spread is often used if it is available or if the trade is large enough. It is a popular choice among many noisy measures although it also suffers from many interpretation difficulties (e.g., Callahan, Lee, & Lombardi Yohn, 1997; Heflin & Shaw, 2005). This study follows the studies of Muller et al. (2002) and Muller et al. (2011) when developing the model supplemented by control variables describing the company. A considerable volume of research suggests that analysts and their coverage play a significant role in regard to the information asymmetry within firms. Many results indicate that minor coverage by analysts with larger spreads and smaller trading (e.g., Amiram et al., 2016; Eleswarapu, Thompson, & Venkataraman, 2004) increases information asymmetry.

Liao, Kang, Morris, and Tang (2013) show that using fair value estimates for the valuation of net assets would increase the transparency of financial reporting and decrease information asymmetry among equity investors. They also argued that bid-ask spreads are the lowest for Level 1 (the most transparent valuation inputs) and highest for Level 3 (the least observable). The investment property valuations of the real estate industry are normally categorized as Level 2 or Level 3 valuations (PWC, 2017).

As mentioned above, all information asymmetry measures incorporate some inaccuracy. Thus, this study uses two alternative measures, the firm's percentage bid-ask spread (*LNSPREADit*) and the standard deviation of recommendations given by analysts (*STDDEVit*), as the dependent variables.

This study examines if the type of the property appraiser affects the level of information asymmetry. The appraisal types examined are an internal appraiser (*NOVALEXT*), a large, well-known external appraiser (*VALEXTL*), and a less well-known external appraiser (*VALEXTO*)—. In this study, *VALEXTL* is defined as an appraiser that has been used at the beginning of a re-

search period three or more times per year by the real estate companies within the sample. Six different appraisers meet the criterion for a large, well-known appraiser: Allsop LLP, CBRE, DTZ (from 2015 together with Cushman & Wakefield following the merger of the two firms), Forum Fastighetsekonomi Ab, Jones Lang LaSalle, and Lambert Smith Hampton.[1] Allsop LLP, Forum Fastighetsekonomi Ab, and Lambert Smith Hampton are local market-leaders and the others are global property consultants. The sample used in this study includes 26 firms that valuate investment properties and the abovementioned large appraisal firms have a market share of about 48 percent. The number of valuation firms that conducted only one real estate company valuation during the first year was 13, and seven appraisal firms valuated two real estate companies. Muller et al. (2002) report that market-makers perceive less information asymmetry across traders for companies commissioning external appraisals in the UK instead of conducting an internal valuation. In this study, the external valuation is differentiated from those conducted by the large, well-known appraisers and other appraisal firms.

The outcome can also be affected by the processes of appraisal smoothing in the private market. Appraisals of investment properties have to make the best estimation of value based on uncertain variables. This process involves an optimal combination of past and current information and could lead to appraisal smoothing and a lag in the true level of values (Baum, Crosby, & McAllister, 2002).

Information asymmetry is reduced when the information level increases and reliable information is produced (e.g., Leuz & Verrecchia, 2000). There are many studies examining the relationship between auditing and the quality of accounting in firms that show a linear relationship between the increase in the quality of disclosed information and the decrease in information asymmetry (e.g. Krishnan & Visvanathan, 2008).

However, Muller et al. (2002) did not find a significant connection between information asymmetry and the use of a Big 6 auditor. Overall, prior studies have documented contradictory findings on the relation between information asymmetry and Big 4 auditing (e.g. Lang & Lundholm, 1996). In this study, a *BIG4* dummy variable is included in models as an independent variable. Both asset appraisers and auditors are important experts and the study will compare them and their effect on information asymmetry. The logarithm of the number of analysts following the firms (*LNANALYST*) is also included as a control variable (see, e.g., Muller et al., 2011) because despite removing the least monitored firm-years, there seems to be a connection between the standard deviation of recommendations given by analysts and the number of analysts following the firm.

Other control variables included in the regressions are company-specific indicator variables for the United Kingdom and Central European origin (*ORI1, ORI2*). Companies of Scandinavian origin, according to the La Porta et al. (1998) classification, are in the reference group (Denmark, Finland, and Sweden).

Information asymmetry can be negatively related to the presence of a controlling shareholder (e.g., Petersen & Plenborg, 2006). One controlling shareholder can attempt to advance their own purposes by manipulating reported performance (Hope, 2013). The dummy variable *OSHIP* is included in the regressions and is assigned a value of one if one shareholder has more than 50 percent of the shares. The control variables *LNVOLAT* (the logarithm of the standard

[1] Revenues of large valuation companies: International companies CBRE 14,2 billion $ (2017), Cushman & Wakefield (DTZ) 6,9 billion $ (2017), Jones Lang LaSalle 6,8 billion € (2016) and local market-leaders Allsop LLP 52 million $ (2017), Forum Fastighetsekonomi Ab 59 million SEK (2016) and Lambert Smith Hampton 113 million $ (2017). Especially in international companies they have also many other activities like consulting and auctions included in revenues.

deviation of daily stock returns) and *LNTURN* (the logarithm of the number of shares traded daily divided by the number of shares outstanding) are included to control for market-makers' costs and risk.

With regard to information asymmetry in the accounting context, it is also important to choose the right point to monitor connections. Kim et al. (1994) noted that different kinds of reports and forecasts can affect information asymmetry differently over a short period. Managerial and annual reports for example can increase information asymmetry around the day they are published. Some studies have applied a four-month lag after the end of the fiscal year when selecting the monitoring point (e.g., Muller et al., 2011). Most of the firms in this sample publish their annual report in March if the fiscal year ends in December, and often offer some income information even sooner on their websites. Therefore, in this study, the monitoring point for variables *LNSPREAD* and *STDDEV* are four months after the end of the fiscal year.

It can be expected that the choice of the appraisal is an endogenous process. It is possible that real estate firms with better performance are more interested to choose large and well-known property appraisers whose estimations are not resulting in over- or under-valuations. Firms, owners, and managers, who have an important role in choosing the appraiser, can have their own incentives depending, for example, on the firm's profitability or leverage. In this study, it is assumed that the stakeholders make their decisions on the basis of the big picture in the company. In this case, the causality means the company will hire important specialists, such as appraisers and auditors, who best help to achieve the goals of the firm in the future.

The following regression specifications are estimated to empirically examine whether the use of external investment property appraisers or Big 4 auditors reduces information asymmetries:

$$LNSPREAD_{it} = \beta_0 + \beta_1 VALUERTYPE_{it} + \beta_2 BIG4_{it} + \beta_3 ORIX_{it} + \beta_4 OSHIP_{it} + \beta_5 LNVOLAT_{it} + \beta_6 LNTURN_{it} + \sum_{t=2008}^{2016} \delta_t year_t + \varepsilon_{it} \quad (1)$$

$$STDDEV_{it} = \beta_0 + \beta_1 LNANALYST_{it} + \beta_2 VALUERTYPE_{it} + \beta_3 BIG4_{it} + \beta_4 ORI1_{it} + \beta_5 ORI2_{it} + \beta_6 OSHIP_{it} + \beta_7 LNVOLAT_{it} + \beta_8 LNTURN_{it} + \sum_{t=2008}^{2016} \delta_t year_t + \varepsilon_{it} \quad (2)$$

where:

$LNSPREAD_{it}$	The logarithm of the firm's percentage bid-ask spread (the quoted spread divided by the mid-point price) calculated as the average over the fourth months after the end of the fiscal year *t* (Muller et al., 2002)
$STDDEV_{it}$	The standard deviation of recommendations given by analysts four months after the end of the fiscal year *t* from Worldscope. Firms with fewer than three analysts have been excluded (Hutira, 2016)
$LNANALYST_{it}$	The logarithm of the number of analysts following the company four months after the end of the fiscal year *t*
$VALUERTYPE_{it}$	$NOVALEXT_{it}$ = an indicator variable taking the value of 1 if the firm is not using an external property appraiser in fiscal year *t*, $VALEXTO_{it}$ = an indicator variable taking the value of 1 if the firm is using an external but not a large, well-known property appraiser in fiscal year *t*, $VALEXTL_{it}$ = an indicator variable taking the value of 1 if the firm is using an external large, well-known property appraiser in fiscal year *t*
$BIG4_{it}$	An indicator variable taking the value of 1 if the firm uses a Big 4 auditor in the fiscal year *t*
$ORI1_{it}$	An indicator variable taking the value of 1 if the firm is located in the United Kingdom
$ORI2_{it}$	An indicator variable taking the value of 1 if the firm is located in Central Europe
$OSHIP_{it}$	An indicator variable taking the value of 1 if the largest shareholder owns more than 50 percent of the firm in fiscal year *t*
$LNVOLAT_{it}$	A logarithm of the standard deviation of daily stock returns during fiscal year *t*
$LNTURN_{it}$	The logarithm of the number of shares traded daily divided by the number of shares outstanding in fiscal year *t*

The data used in the empirical analysis consist of publicly traded real estate companies in the EU countries (Table 1) and cover the period from 2007 to 2016. The sample and all companies in the sample conduct accounting under IAS 40 showing fair values and investment property had to make up more than half of the total property plant and equipment in 2007 (the first year studied). After omitting defective data, depending on the model, between 307 to706 firm-years observations are used in the regressions. The continuous variables are winsorized by one percent. Within the regressions, both years and companies are clustered and the models have year fixed effects. The data are collected from Bureau van Dijk Orbis, Thomson Reuters Worldscope, and the annual reports of the real estate firms. Most of the dummy variables (*NOVALEXT*, *VALEXTO*, *VALEXTL*, *BIG4*, *ORI1*, and *ORI2*) are collected manually from annual reports, the ownership data is drawn from Orbis, and the financial ratios from Worldscope.

Table 1. Sample firms by country and year

COUNTRY	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	TOTAL
UK	16	18	18	15	15	14	14	14	13	13	150
Netherland	2	2	2	2	2	2	1	1	2	2	18
Belgium	5	5	5	5	5	5	5	4	5	5	49
France	10	13	15	14	15	12	11	11	10	10	121
Greece	2	3	3	2	2	3	3	3	1	1	23
Italy	3	3	3	3	3	3	2	3	3	1	27
Spain	2	2	2	2	2	1	2	2	2	1	18
Austria	2	2	2	2	2	2	2	2	2	2	20
Germany	14	14	14	16	14	11	9	9	8	8	117
Denmark	3	3	5	5	5	5	3	4	3	4	40
Finland	3	3	3	3	3	3	3	3	3	3	30
Sweden	10	10	10	10	10	9	9	9	8	8	93
Total	72	78	82	79	78	70	64	65	60	58	**706**

4. Empirical results

4.1 Descriptive statistics

Table 1 shows that the three distinctly largest countries in the data in terms of observation availability are the UK, Germany, and France. Three Scandinavian countries (Denmark, Sweden, and Finland) constitute the same size group together. 21 percent of the sample firms are from the United Kingdom and close to 55 percent are from Central European EU countries. It is also noteworthy that the number of the firms has diminished clearly through consolidations and bankruptcies during the sample period.

The variables used in this study are presented in Table 2. The mean of the dependent variable *LNSPREAD* is -4,302 and the average of *STDEV* is 0,935 while the maximum value is 2,00.

Table 2. Descriptive statistic

	N	MEAN	STD	MIN	QUARTILE 25 %	MEDIAN	QUARTILE 75 %	MAX
LNSPREAD	706	-4,302	1,438	-7,708	-5,287	-4,320	-3,355	0,338
STDDEV	307	0,935	0,336	0	0,740	0,945	1,120	2,000
LNANALYST	307	2,106	0,583	1,099	0,693	1,609	2,398	3,296
NOVALEXT	706	0,101	0,301	0	0	0	0	1
VALEXTO	706	0,421	0,494	0	0	0	1	1
VALEXTL	706	0,478	0,500	0	0	0	1	1
BIG4	706	0,719	0,45	0	0	1	1	1
ORI1	706	0,210	0,408	0	0	0	0	1
ORI2	706	0,549	0,498	0	0	1	1	1
OSHIP	706	0,376	0,485	0	0	0	1	1
LNVOLAT	706	0,912	1,855	-3,537	-0,338	0,947	1,955	6,006
LNTURN	706	4,171	2,185	-3,507	2,940	4,487	5,816	8,050

Variables are defined in the text.

The mean of *LNANALYST* corresponds to 8,2 analysts and the largest number of analysts monitoring a firm is 27. The number of firms using an external appraiser is close to 90 percent of all firm-year observations in the sample and the proportion of large external appraisers is approximately 48 percent. One major shareholder (*OSHIP*) is evident in about 38 percent of firm-year observations while approximately 72 percent of firms adopt a Big 4 auditors. The control variable *LNVOLAT* has a mean of 0,91. The total assets of the real estate firms included in the sample vary from EUR 4,8 to EUR 18255,9 million, and the mean is approximately EUR 700 million.

Table 3 presents the Pearson correlations of the variables used in this research. The highest correlation of 0,73 is between *VALEXTO* and *VALEXTL*. Thus, models that include *VALEXTO* and *VALEXTL* simultaneously should be interpreted with caution.[2]

2 *VALEXTO* and *VALEXTL* are simultaneosly included in Models 13 and 17. The variance inflation factors of these models are 3,6 and 7,3, respectively.

Table 3. Pearson correlations

	LNSPREAD	STDDEV	LNANALYST	NOVALEXT	VALEXTO	VALEXTL	BIG4	ORI1	ORI2	OSHIP	LNVOLAT	LNTURN
LNSPREAD	1,00											
STDDEV	0,09	1,00										
LNANALYST	-0,69***	0,18***	1,00									
NOVALEXT	0,20***	0,01	-0,27***	1,00								
VALEXTO	0,21***	-0,07	-0,03	-0,37***	1,00							
VALEXTL	-0,35***	0,06	-0,18***	-0,36***	-0,73***	1,00						
BIG4	-0,42***	0,09	0,17***	-0,04	-0,26***	0,28***	1,00					
ORI1	-0,01	-0,02	0,04	-0,07**	-0,14***	0,19***	-0,09***	1,00				
ORI2	0,13***	0,14***	-0,05	-0,03	0,18***	-0,16***	-0,13***	-0,60***	1,00			
OSHIP	0,17***	-0,01	-0,23***	0,16***	0,04	-0,15***	-0,16***	-0,17***	0,31***	1,00		
LNVOLAT	-0,19***	-0,10*	0,02	0,05	-0,18***	0,15***	-0,01	0,52***	-0,39***	-0,13***	1,00	
LNTURN	-0,52***	-0,05	0,33***	-0,18***	-0,13***	0,26***	0,26***	0,26***	-0,45***	-0,35***	0,21***	1,00

Notes: *, **, *** denote significance of the Pearson correlations at the 0,10, 0,05 and 0,01 levels, respectively. Variables are defined in the text.

4.2 Information asymmetry regressions

Tables 4 and 5 show the estimation results of regressing *LNSPREAD* and *STDDEV* on the property appraiser dummies and the control variables. The R^2's of the 17 different regressions vary from 17,5 to 45,3 percent. In all regressions, the standard errors are clustered both by firm and year.

Table 4. Information asymmetry regressions when *LNSPREAD* is the dependent variable

LNSPREAD	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	MODEL 7	MODEL 8	MODEL 9	MODEL 10	MODEL 11	MODEL 12	MODEL 13
NOVALEXT	0,401***			0,513***	0,289**	0,393***							
	(3,05)			(3,90)	(2,20)	(2,95)							
VALEXTO		0,163*					0,195**	0,183**	0,199**				-0,261*
		(1,84)					(2,19)	(2,10)	(2,28)				(-1,88)
VALEXTL			-0,328***							-0,413***	-0,298***	-0,366***	-0,581***
			(-3,73)							(-4,61)	(-3,47)	(-4,11)	(-4,12)
BIG4	-0,789***	-0,750***	-0,712***	-0,734***	-0,842***	-0,792***	-0,693***	-0,803***	-0,759***	-0,633***	-0,774***	-0,703***	-0,706***
	(-7,35)	(-6,82)	(-6,52)	(-7,04)	(-8,10)	(-7,60)	(-6,54)	(-7,73)	(-7,28)	(-5,95)	(-7,36)	(-6,64)	(-6,66)
ORI1				0,613***		0,418***	0,554***		0,343***	0,648***		0,454***	0,502***
				(4,58)		(3,05)	(4,12)		(2,56)	(4,85)		(3,34)	(3,66)
ORI2					-0,540***	-0,404***		-0,585***	-0,486***		-0,553***	-0,415***	-0,371***
					(-5,21)	(-3,83)		(-5,66)	(-4,62)		(-5,40)	(-3,97)	(-3,55)
OSHIP	-0,170*	-0,124	-0,135	-0,152*	-0,099	-0,105	-0,097	-0,055	-0,05	-0,106	-0,072	-0,068	-0,091
	(-1,85)	(-1,34)	(-1,46)	(-1,71)	(-1,06)	(-1,15)	(-1,08)	(-0,59)	(-0,55)	(-1,20)	(-0,76)	(-0,74)	(-1,01)
LNVOLAT	-0,105***	-0,089***	-0,085***	-0,186***	-0,163***	-0,208***	-0,159***	-0,153***	-0,185***	-0,165***	-0,147***	-0,188***	-0,195***
	(-4,39)	(-3,64)	(-3,54)	(-6,12)	(-5,88)	(-6,45)	(-5,27)	(-5,36)	(-5,83)	(-5,66)	(-5,25)	(-6,07)	(-6,26)
LNTURN	-0,287***	-0,288***	-0,281***	-0,308***	-0,332***	-0,334***	-0,307***	-0,335***	-0,338***	-0,301***	-0,326***	-0,329***	-0,326***
	(-11,48)	(-11,62)	(-11,34)	(-12,17)	(-12,38)	(-12,52)	(-12,21)	(-12,74)	(-12,85)	(-12,02)	(-12,49)	(-12,61)	(-12,44)
Observations	706	706	706	706	706	706	706	706	706	706	706	706	706
R-squared	0,417	0,413	0,422	0,435	0,437	0,444	0,428	0,437	0,442	0,441	0,443	0,451	0,453
F	29,75	27,37	29,13	29,43	29,89	28,79	26,89	28,54	27,11	30,12	30,07	29,49	29,15

Table 4 shows that when *LNSPREAD* is used as the dependent variable, the coefficient for internal valuation (*NOVALEXT*) is significant and positive, indicating a larger degree of information asymmetry. In other words, the use of external appraisals seems to decrease information asymmetry. Model 13 shows that the impact of the external large well-known property appraiser is more effective to information asymmetry compared with the use of an external but not a large appraiser, more than double in magnitude. For example, in Model 2 *VALEXTO* gets a positive significant coefficient which strengthens the same conclusion when the structure of the control group (the portion of *NOVALEXT* approximately 10 % and the dominant *VALEXTL* 48 % of the total) is taken into consideration. In addition, the coefficient for *BIG4* is negative and significant at the 1 percent level and reports an even stronger decreasing effect on information asymmetry. The result indicates that when the firm will hire these two important experts, the external (and even the external large well-known property appraiser) and the Big 4 auditor, it leads to smaller information asymmetry in this firm. Therefore, Hypotheses 1 and 2 can be accepted in the case of bid-ask spreads as the dependent variable.

The coefficient estimate for the control variable *OSHIP* is negative and significant at the 10 percent level in some models, indicating slightly that concentrated ownership can lead to lower information asymmetry. The statistically significant coefficients for the firm origin dummy variables indicate that firms located in the UK are associated with larger and firms located in central European EU countries with lower information asymmetries than the reference group. The coefficients for the control variables *LNVOLAT* and *LNTURN* are negative and significant at the 1 percent level.

Table 5. Information asymmetry regressions when *STDDEV* is the dependent variable

STDDEV	MODEL 14	MODEL 15	MODEL 16	MODEL 17
LNANALYST	0,121***	0,116***	0,114***	0,120***
	(3,24)	(3,18)	(3,10)	(3,25)
NOVALEXT	-0,125			
	(-1,07)			
VALEXTO		-0,073*		-0,163
		(-1,89)		(-1,37)
VALEXTL			0,050	-0,097
			(1,25)	(-0,81)
BIG4	0,217***	0,201***	0,205***	0,204***
	(3,84)	(3,57)	(3,65)	(3,62)
ORI1	0,192***	0,165***	0,162***	0,178***
	(3,18)	(2,66)	(2,67)	(2,99)
ORI2	0,146***	0,126**	0,123**	0,137***
	(2,88)	(2,42)	(2,36)	(2,66)
OSHIP	-0,023	-0,020	-0,009	-0,031
	(-0,47)	(-0,40)	(-0,18)	(-0,63)
LNVOLAT	-0,051***	-0,051***	-0,050***	-0,053***
	(-3,86)	(-3,87)	(-3,76)	(-3,96)
LNTURN	-0,115	-0,017	-0,016	-0,015
	(-0,82)	(-1,15)	(-1,07)	(-1,06)
Observations	307	307	307	307
R-squared	0,175	0,179	0,175	0,182
F	4,12	3,80	3,63	3,93

Notes: Coefficient estimates and standard errors for regressions are reported. The standard errors are robust errors clustered by year and company. The models have also year fixed effects. *, **, *** denote two-tailed statistical significance at the 0,10, 0,05 and 0,01 levels, respectively. The continuous variables are winsorized one percent in each tail. Variables are defined in the text.

The results reported in Table 5 indicate that the type of external appraisal does not influence the standard deviation of analysts' recommendations. Only in Model 15, the estimated coefficient for *VALEXTO* is negative and statistically significant, suggesting that external appraisal may decrease information asymmetries. Surprisingly, the coefficients for *LNANALYST* and *BIG4* are positive and highly significant. Counterintuitively these results suggest that information asymmetries are more prevalent for firms that are followed by more analysts and are audited by the Big 4 audit firms.

5. Conclusions

This paper examines whether the use of external investment property appraisers or the adoption of Big 4 auditors reduces information asymmetry across market participants in the real estate industry. The data used in the empirical analysis comprises publicly traded real estate firms in the European Union over the period 2007–2016. The degree of information asymmetry is measured with the firm's percentage bid-ask spread and the standard deviation of analyst recommendations.

The analysis was motivated by the need to monitor seldom-measured factors and the information asymmetry of financial reporting. The main finding of this study is that the choice of external valuation for investment properties may result in less information asymmetries, especially if the external valuation is performed by a large, well-known appraisal firm. With regard to the effect of involving a Big 4 auditor, the effect seems to be similar but stronger in magnitude.

Because systematic differences in property valuations may materialize between the different types of appraisers, regulators could still sharpen the recording demands: for example, how often and what percentage of the whole investment property should be valued by an external appraisal. It would also be important to consider whether mandatory external property valuations should be requested because the difference between internal and external valuations seems to trigger information asymmetries. The main conclusion of this study is consistent with Ghosh, Liang and Petrova (2020), who document the importance of the availability of appraisal data for real estate investors in reducing information asymmetries.

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