Capital markets and valuation models of investment properties. A pre and post crisis analysis

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**A B S T R A C T**

This work analyses the effect of the fair value and historical cost models, optionally applicable under IAS 40 for investment properties on the market value of Spanish groups of real estate listed companies between 2005 and 2018. The results of the application of the Ohlson Model do not suggest any relationship of financial information with the market value in the pre-crisis and economic crisis periods. However, in the post-crisis period, financial information represented by book value gains relevance, showing a significant positive relationship with the market value of real estate companies, although suggesting a reduction in the asymmetry of financial information in companies using the fair value method.

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**Mercados de capitales y modelos de valoración de inversiones inmobiliarias. Un análisis pre y post-crisis**

Este trabajo analiza el efecto de los modelos de valor razonable y coste histórico, aplicables opcionalmente según la NIC 40 para las inversiones inmobiliarias, sobre el valor de mercado de los grupos inmobiliarios cotizados españoles entre 2005 y 2018. Los resultados de la aplicación del Modelo de Ohlson no sugieren relación alguna de la información financiera con el valor de cotización en los períodos de pre-crisis y crisis económica. Sin embargo, en el periodo post-crisis, la información financiera representada por el valor en libros gana en relevancia, mostrando una relación positiva significativa con el valor de mercado de las empresas inmobiliarias, aunque sugiriendo una reducción en la asimetría de la información financiera en las empresas que utilizan el método del valor razonable.

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1. Introduction

The study of the explanatory power of financial statements of real estate companies on their share value has generated continuous interest in recent decades (i.e. Alberich and Blandón, 2012; Argilés et al., 2011; Collins et al., 1997; Devalle & Rizzato, 2011; Ghosh et al., 2020; Guthrie et al., 2011; Israeli, 2015; Liang & Riedl, 2014; Liao et al., 2020; Mäki et al., 2016; Nellessen & Zuelch, 2011; Pinto & Pais, 2015; De Souza et al., 2015; Sundgren et al., 2018; De Vicente-Lama et al., 2017; Wahyuni et al., 2019). Our work also aims to analyse the influence of alternative valuation models of investment properties based on historical cost and fair value, respectively, on the market value of real estate companies, in a context of particular market sensitivity by the influence of the economic crisis.

To do this, we analysed a sample of listed, Spanish real estate groups in the period going from 2005 to 2018, thereby considering the effect of the economic crisis, with a special impact in Spain on the market prices of investment properties.

Interest in this issue was accelerated in the first years of this century, along with a trend towards the implantation of fair value criteria, based on the hypothesis that financial information under the traditional criteria of historical cost had lost utility for investors. The historical cost does not include, as such, changes in the prices of real estate assets, although it does include other changes such as depreciation or impairment. Its assessment is not free from subjectivism (IASB, 2018, Conceptual Framework for Financial Reporting, 6.6-6.7) and has been subject to criticism due to its lack of relevance because the assets valued at cost, over time, have values that are not in line with the current equity situation (De Andrés Suárez & Lorca Fernández, 2003; Pulido Álvarez, 2000). This has caused a trend towards more market-oriented criteria and changes in value, such as fair value (Allen & Ramanna, 2013; Dichev & Tang, 2008; Givoly et al., 2017; Magnan, 2009; Sutton et al., 2015). Fair value was about responding to the growing need for updated information in a more globalized world (Marra, 2016) providing, ultimately, more relevant information for decision-making, by incorporating current economic events, which occurred, therefore, after the recognition of the element in the company's assets (Barth, 2007).

The need for a market with liquidity, with constant quotations and available to the user at any time, has traditionally made the assets that are most valued by the fair value criterion to be, for the most part, financial assets (Cairns et al., 2011; Eccher et al., 1996; Rodríguez-Bolívar & Navarro-Galera, 2012; Tahat et al., 2016). Thus, fair value is less widespread in other types of non-financial assets such as biological assets or investment property (Argilés et al., 2011; Cairns et al., 2011; Christensen & Nikolaev, 2013), many times due to the continuous use of the historical cost criterion (Cairns et al., 2011; Quagli et al., 2010), or even due to a lack of knowledge of the advantages of the fair value criterion and applicability conditions (Laux & Leuz, 2009). However, this criterion could be applied to all types of assets (Linsmeier, 2016).

Specifically for investment properties which obtain income and/or capital gains, IAS 40 allows to choose between two subsequent valuation criteria: the cost model or the fair value model. Some opinions believe that fair value is more useful to represent the true image of equity, as well as to improve the timeliness of the financial statements (Navarro-Galera, 2016; Rodríguez-Bolívar & Navarro-Galera, 2012). The International Accounting Standards Board (IASB) even considered it initially as the sole criterion in the subsequent valuation of investment property, although it rejected this idea due to the lack of maturity of the markets that prevented the fair value model from working satisfactorily (IASB, 2018; NIC 40: FC.12).

Our results show that, despite the better perceived relevance and explanatory power of information under fair value criterion in crisis periods, after the crisis, in recent times, there is a similar tendency in terms of the markets' perception of financial information regardless of the valuation criteria applied to investment properties. Earnings per share are not relevant in determining the market price during the whole period analysed. In the post-crisis period, our results confirm that the financial information represented by the book value of real estate companies gains relevance significantly. Thus, the net worth shows a positive relationship with the market value, slightly more strongly in the case of companies that use the historical cost method, which suggests a further reduction in the asymmetry of financial information in companies under the fair value method. Such results show the relevance of financial information for investors in the capital market during the analysed period on a kind of assets that has been less studied empirically, as it is the case of investment properties. The results may have implications as well for accounting regulators given that, as suggested in the Conclusions section, current regulation could improve by opting for a dual system that combines historical cost with fair value criteria for investment properties valuation, joining thus the advantages that are derived from either of these criteria. Finally, our study contributes to prior literature in providing empirical evidence of the comparison of both criteria in a double sense: i) Analysing the effect of the valuation criterion on investment properties, whose attention in prior literature is scarce; and, ii) taking as a key element to consider in further research analyses the consequences of the whole economic cycle, including a large period of time.

The work begins with a review of the treatment of historical cost and fair value models by the previous literature. It continues with the description of the theoretical framework around the relevance of financial information regarding financial investments that justifies the development of the hypotheses proposed. The methodology to be followed and the main results obtained are explained in sections 4 and 5, respectively. Lastly, the work concludes with the main findings.

2. Fair value in investment property

IAS 40 establishes the cost model as the initial valuation criterion, but for the subsequent valuation it offers the option of choosing between two alternatives: the historical cost model and the fair value model (IASB, 2018; NIC 40: 20 & 30). This possibility of choice highlights the tension between two qualitative characteristics of financial information: relevance and reliability (Livne & Markarian, 2018). Whereas with the application of cost price, one chooses accurate and objective information, that is, features associated with reliability, the use of fair value provides timelier and therefore more relevant information (De Vicente-Lama et al., 2013). IAS 40 offers a pure accounting alternative, since it is the preparer of financial information who will select the option that will best serve to communicate the results or resources that the entity has, although it may harm the comparability of financial statements since they choose a different valuation criterion for properties with the same purpose (De Vicente-Lama et al., 2012; Pérez & Tey, 2007).
IAS 40 itself leans towards the fair value model, indicating the mandatory disclosure of fair value in investment properties, regardless of the subsequent valuation model chosen (i.e. Caparrós & Manzanares, 2007; De Vicente-Lama & Sánchez, 2010; Quagli et al., 2010). Unlike IAS 16, which allows a revaluation model against equity, the IASC determined that the changes in value under this model should be allocated to the result of the year, for the fair value model had been constructed to give greater relevance and transparency to the results coming from investment properties. It was therefore considered incongruous to allow or require its recognition in the equity (IASB, 2018; NIC 40: FC. B 65 a).

International accounting standards presume that fair value can always be measured reliably and continuously. This fair value is a starting price (IASB, 2017; NIIF 13:9), based on the market, which does not depend on the specific conditions of an entity. Hence, the company must act as a market participant setting the price of the asset or liability under current conditions, taking into account some risky circumstances. In this sense, a hierarchical fair value measurement basis is proposed, giving priority to listed prices and lastly, to values that are not observable, in the latter case it is necessary to use estimation techniques, such as updating expected cash flows from the asset over its useful life (IASB, 2017; NIIF 13:72). As there is no single option for estimation, the relevance of such value varies and so does the effect or result on the information provided to investors (Ronen, 2008).

In determining fair value, the starting point is level 1, a scenario where there are active markets and therefore the price is known by both parties, until level 3, where estimation techniques used to determine fair value are based on some unobservable inputs, involving the subjectivism of the preparers of financial information. Landsman (2007) even proposes the use of a mixed model (historical cost/fair value) to avoid making erroneous estimations of fair value when there is no active market. As the level rises, the information asymmetry between preparers and users increases due to the increase of uncertainty in assessing the fair value (Majercakova & Skoda, 2015: 315-316).

Additionally, in the case of non-financial assets, this problem may happen that there is a property that has been converted into investment property due to its change of use and at that time the determination of its fair value is not reliable, because the market is not considered active and alternative fair value techniques, such as discounted cash flow projections are not available either (IASB, 2018; NIC 40: 30, 53 & 54). Despite this presumption, there are studies that determine the extent to which fair value is used, as an opportunistic option, since they have the possibility of reflecting gains or losses according to managers’ intention, as a consequence of changes in this value, and which has an immediate impact on financial markets (Guthrie et al., 2011).

Unlike financial instruments, and even other assets with a higher activity in markets (e.g. raw materials, agricultural products, etc.), real estate that is classified as investment properties usually do not have an active market where their prices are frequent and regularly available. Therefore, it is necessary to estimate the fair value through various valuation methods, on many occasions of an indirect nature; noting that the use of them frequently implies the use of professional judgments, which supposes a certain degree of subjectivity and manipulation in the valuation (Díaz, 2010), because the company’s own assumptions are unavoidable.

It should be noticed that the valuation aims to be useful for users of financial information, which is conditioned by the characteristics of the environment at the time of valuation (AECa, 1989: 18-20); this also implies to choose the valuation model that best suits these circumstances (Requena Rodríguez, 1977: 222). In this line, the value of an element in accounting is not an intrinsic quality but a concept related to people and their motivations to know this valuation (Barnay & Calba, 1998: 22-38; Becker Gómez, 1985: 193). The inherent subjectivity of the valuation can be reduced by starting from an analysis of the data and by requiring the opinion of experts to justify the application of different methods (Sanjurjo, 1999: 22).

The difficulty in calculating fair value increases with the lack of objective data provided by the market, and when this is not possible, one must even resort to accepted methods of indirect estimation (Constans, 2007). In investment properties, full advantage should be taken of the information that comes from the market, whenever it exists and has a certain activity. If this is not the case, it should be considered using indirect valuations based on the market, such as appraisals by independent professionals or other experiences or sufficiently experienced calculation methods. Whenever it is necessary to make estimates to determine the fair value, the best method is the market approach in the case of investment properties. This method is based on prices and other relevant information that has taken place in market transactions with real estate that is identical or similar to the one we want to measure, such as the price per square meter (Palavecinos & Azúa-Álvarez, 2006).

3. Theoretical framework and development of hypothesis

The quality of financial information is understood on the basis that it is useful for decision-making of its main users (owners, lenders and other creditors) (IASB & FASB, 2006, OB2-4). This quality is mainly summarised in two characteristics: reliability and relevance (IASB & FASB, 2006, QC-1). Reliability is associated with the faithful representation of economic events, so that they describe the economic essence of the underlying transaction, indicating that it must be complete, neutral and free from material error (IASB & FASB, 2006, 2008). Relevance, on the other hand, focuses on the capacity of the information to make a difference in the users’ decisions, indicating that it must have predictive and/or confirmatory value (IASB & FASB, 2008, QC-3). However, these qualities come into conflict, with the understanding of the literature that they are contradictory and exclusive (Argilés et al., 2011; Christensen & Nikolaev, 2013; Hitz, 2007; Quagli et al., 2010). In this sense, there is a great deal of literature on the study of the relevance of financial information (i.e. Barth et al., 2001; Batista & Paulo, 2017; Holthausen & Watts, 2001; Jenkins et al., 2009; Song et al., 2010; Sundgren et al., 2018). In the case of financial assets, the previous research finds a greater influence of their fair value, compared to their historical cost, on the market price of the company (Barth, 1994; Barth et al., 1996; Eccher et al., 1996; Nelson, 1996). However, in the case of non-financial assets, the fair value may not provide greater relevance (Christensen & Nikolaev, 2013), probably because it is affected by the amount of measurement error and the source of estimations (Landsman, 2007). Additionally, in the case of non-financial assets, this problem is affected by the lack of explanation of the motivations behind the accounting choice between historical cost and fair value (i.e. Ball & Shivakumar, 2006; Hail et al., 2010; Laux & Leuz, 2009).

Thus, in the case of investment properties, there is a great
discrepancy in the existing literature. On one hand, those who consider greater relevance of fair value versus historical cost (Allen & Ramanna, 2013; Baboukardos & Rimmel, 2014; Barth, 2014; Ethalaiye et al., 2017; Magnan, 2009; Zamora-Ramirez & Morales-Diaz, 2018), on the other, the position in favour of historical cost (Acaranupong, 2017; Liao, 2013; Machado & Machado, 2013; Magnan, 2009; Müller et al., 2015; Siam & Abdullahi, 2011). Other studies have found no empirical evidence that the fair value model increases the explanatory power of the price based on financial information (Hassan et al., 2006; Machado & Machado, 2013; McNinis et al., 2018), or they show mixed evidence (Danbolt & Rees, 2008; Hitz, 2007; Koonce et al., 2011; Sellhorn & Stier, 2019).

Among the arguments in favour of fair value as an instrument to increase the relevance of the financial information, fair value uses market-based criteria, which theoretically contributes to financial information connecting better with the economic reality of the company (Dichev & Tang, 2005). This leads to a decrease in the company’s equity valuation error (Boone, 2002; Hitz, 2007), because fair value, given the greater discretion for managers, provides more information than the strict historical cost criterion (Hitz, 2007; Lev et al., 2010; Marra, 2016; Tahat et al., 2016). Thus, fair value improves other qualitative characteristics of financial information: Given that market data is more universal, easily observable and accessible to the user than the information from the historical cost criterion, more dependent on each company, fair value allows to increase comparability (Hail, 2013; Navarro-Galera, 2010; Rodriguez-Bolivar & Navarro-Galera, 2012) and comprehensibility (Navarro-Galera, 2010; Rodriguez-Bolivar & Navarro-Galera, 2012). In addition, it facilitates future estimations based on financial information (Hail, 2013), especially from future operating cash flows (Argilés et al., 2011; Ethalaiye et al., 2017; He et al., 2018), although to a greater extent for concepts related to balance sheet figures than for those based on earnings (Beisland & Knivsfjål, 2015; Danbolt & Rees, 2005).

In this sense, although some results have not been conclusive (i.e. Barth & Clinch, 1998), previous research suggests the existence of a significant positive relationship between share prices and revaluations of property, plant and equipment (Abody et al., 1999; Gómez & Alvarez, 2013). This leads us to our first hypothesis:

**H1.** The fair value measurement model of investment properties has a greater explanatory power of the market price than the historical cost model.

Although not conclusive, current stream of literature is focused on the procyclicality of fair value accounting and how it possibly produces a negative amplification of business cycles during the international financial crisis (see discussion at IMF, 2009). Fair value is supposed to reflect the sum of all the risks the market assigns to the asset, but even under market input observations, it would be considered that markets may fail when pricing risks appropriately. It seems to be accepted that “fair” market value may diverge from the underlying economic value of an asset, due to market tendencies to overreact to the underlying value of an asset both during upturns and downturns. Pro-cyclical and self-reinforcing “write-ups” of assets may be caused by incentives of investors during expansive cycles. Then, the use of fair value accounting could itself exaggerate rising prices during upturns as well as lead to sharper fall during the downturn (Caruana & Pazarbasioglu, 2008).

Among limitations of fair value accounting, the existing literature remarks the greater subjectivity (Liu et al., 2012; Marra, 2016), as well as the ambiguity of the standards themselves regarding its application (Siam & Abdullahi, 2011). This can lead to the increase earnings management (Danbolt & Rees, 2008; Magnan, 2009), and even, investor fraud cases (Siam & Abdullahi, 2011). In general, it is observed that, although the fair value improves the prediction of operating cash flows (Ethalaiye et al., 2017; Lev et al., 2010), it does not offer much more information than the one provided by working capital, and may even diminish earnings predictability (Beisland & Knivsfjål, 2015; Ethalaiye et al., 2017; Lev et al., 2010; McNinis et al., 2018).

This subjectivity in the estimation of the fair value, which lacks the justification in the transaction as it happens with historical cost, causes fair value to diminish the reliability of the financial information (Allen & Ramanna, 2013; Bick et al., 2015; Lev et al., 2010; Lhapadchhan, 2010; Magnan, 2009; Müller et al., 2015). Its difficulty in obtaining or estimating also contributes to the conclusion that the usefulness of the fair value criterion is not common in all cases, but it will depend on the circumstances (Givoly et al., 2017; Kothari et al., 2010; Linsmeier, 2016). Primarily, it requires the existence of a secondary market for the asset with liquidity (Allen & Ramanna, 2013; Eccher et al., 1996; Milburn, 2008; Rodríguez-Bolivar & Navarro-Galera, 2012), in a sense that is possible to obtain the information for the valuation in a reliable way and at a cost that is not very high (Christensen & Nikolaev, 2013; Danbolt & Rees, 2008; Quagli et al., 2010). In addition, the reference market to establish the price that serves as an estimation of fair value is required to be efficient (Hail, 2013; Lhapadchhan, 2010; Milburn, 2008), so that investors are not influenced by any non-neutral information of the company, given that this information is incorporated into the market price (Lhapadchhan, 2010). In this sense, the greater fair value estimation level, the more information must access the investor, because the measures of such value are not observable (Landsman, 2007). In addition, the existing literature suggests other circumstances that may vary the effectiveness of fair value, such as the type of users who receive the information (it is valued differently by equity investors and debt investors) (Givoly et al., 2017), and that the company under fair value criterion is not in a situation where it is expected that it will have to sell the asset under valuation before the end of its maturity or useful life (Linsmeier, 2016).

This loss of reliability may also stem from the greater difficulty in obtaining fair value (Hail, 2013; Müller et al., 2015) and the volatility of the markets on which it is based (Hail, 2013; Song, 2015). This eventually decreases the liquidity of the assets (Ghosh et al., 2020; Magnan, 2009), which may appear in the balance sheet with a continuous spiral of undervaluation in times of crisis (Hail, 2013). Considering that, we formulate our second hypothesis as follows:

**H2.** The explanatory power on the price of valuation models at fair value and historical cost is modified in situations of economic crisis.

### 4. Methodology

#### 4.1. Sample Selection

The period under analysis covers 13 years, from 2005, the year in which the mandatory application of IAS-IFRS for Spanish consolidated financial statements began, until 2018. This time interval is especially relevant in the Spanish real
Table 1. Distribution of the sample

<table>
<thead>
<tr>
<th>Company</th>
<th>Available years</th>
<th>%</th>
<th>Historical Cost Method</th>
<th>%</th>
<th>Fair Value Method</th>
<th>%</th>
</tr>
</thead>
</table>

Total available years 103
Pre-crisis (2005-2007) 12
Crisis (2008-2014) 41
cost: 43.6%
Post-crisis (2015-2018) 41
cost: 43.6%

Total observations 94
100%

The selection of the sample under study starts from the groups of Spanish companies listed on the Spanish Stock Exchange Market, belonging to the sub-sector "Real Estate and Others" within the "Financial and Real Estate Services" sector. As defined by the Spanish stock exchange authority, this sub-sector includes those companies whose activity is real estate development, rental and management of real estate assets, whether on their behalf or on behalf of third parties (BME, 2019); thus, this selection avoids the influence in our analysis of market value of other assets. The distribution of the analysed sample by periods is detailed in Table 1, differentiating the financial years with available information and, among them, those years in which every entity has applied one or another subsequent valuation model for their investment properties (cost model and fair value model).

Out of the 103 previous observations, 9 have been eliminated due to lack of market value, resulting in a final sample of 94 observations, distributed as summarised in Table 1 according to the valuation model used in these investment properties and in the three temporary sub-periods analysed. In the distribution of the sample, there is proportionality between the companies valued at fair value (48.9%), compared to those using historical cost (51.1%) and some decompen-

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4.2. Definition of Variables. Ohlson Model

The Ohlson model is widely used by previous literature to explain the market value of companies listed on financial markets (Feltham & Ohlson, 1995; Kuo, 2017; Larrán Jorge & Piñero López, 2005; Ohlson, 2001). Its use as a useful tool to explain the share price under different scenarios as a consequence of different economic situations, is justified in its flexibility, which allows it to adapt to various business situations, allowing an adapted definition of the explanatory variables.

In the resulting model, the value of the price (dependent variable) will be explained by the independent variables, book value and earnings per share, related to the value of its equity, according to the following expression:

\[ LST_t = \alpha + \beta_1 \text{BOOK VALUE}_t + \beta_2 \text{RESULT PER SHARE}_t + \epsilon \]

Where,

- \( LST_t \): Listed price of the company’s stock at the end of the financial year.
- \( \text{BOOK VALUE}_t \): Equity per share of the company that applies the fair value model for the valuation of investment property.
- \( \text{RESULT PER SHARE}_t \): Income before taxes for the year per share.
- \( \text{EPS HISTC} \): Income before taxes for the year per share, obtained from the profit and loss statement, if the valuation model applied is the historical cost.

This general model has been applied specifically for each valuation method of investment properties, in accordance with the following definition of variables:

**Model 1. Historical cost:**
\[ LST_t = \alpha + \beta_1 \text{V}_t \text{BKS HISTC} + \beta_2 \text{EPS HISTC} + \epsilon \]

**Model 2. Fair value:**
\[ LST_t = \alpha + \beta_1 \text{V}_t \text{BKS FRV} + \beta_2 \text{EPS FRV} + \epsilon \]

There is only one company belonging to this sector which has not been included in the sector. This company is “Colonial”. The reason to exclude this company is because, analyzing the descriptive statistics by company (un-tabulated) we have observed that Colonial shows a considerable high dispersion both in the stock price and in the book value per share. We have carefully analyzed the notes of the company that are referred to the equity. It can be observed that the company does not show a stable share capital policy (as an example, the company had a share capital increase converting bonds into shares in 2010; share capital amortization to compensate accumulated losses in 2011; a new share capital increase in 2016...). Furthermore, the stock price shows a high extent of volatility because of the continuous change into split and contra-split operations. All these things together, we consider the deletion of this company, for the Ohlson model is fully determined by both share prices and equity policies of the firm.
EPS\_FRV: Income before taxes for the year per share, obtained from the profit and loss statement, if the valuation model applied is that of fair value.

Given that some variables are prone to have extreme values that may mislead the results in the analyses, to overcome such problem we have winsorized the variables at 1% level. We have opted for the winsorization technique rather than trimming the sample due to the reduced sample size.

5. Results and discussion

The descriptive results in Table 2 (winsorized values) show how fair value is valued on an average lower than historical cost (0.005 vs. 0.050). In the same way, the standard deviation in the case of fair value is lower than the historical cost (0.006 vs. 0.312). This notably smaller deviation is indicative of a more uniform valuation, where there is less incidence of extreme values. Therefore, in general terms, it can be considered that the average book value is more representative of the population in companies with subsequent measurement at fair value.

Regarding earnings per share, we can observe that, on average, the values are close in both cases, although it is slightly higher when the valuation is with historical cost compared to the fair value (0.006 vs. 0.000). The standard deviation at historical cost (0.038) is also greater than at fair value (0.001), which leads us to conclude again that the average earnings per share of companies that use the fair value method is more representative of the population. In this sense, it can be seen that the minimum values in both cases are the same (-0.003), but the maximum differs substantially in the case of fair value (0.003 vs. 0.265), so the range of values is much larger for the first case (fair value).

Table 2. Descriptive statistics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Nº of Obs.</th>
<th>Mean</th>
<th>Std.Dev.</th>
<th>Minimum value</th>
<th>Maximum value</th>
</tr>
</thead>
<tbody>
<tr>
<td>LST</td>
<td>94</td>
<td>30.768</td>
<td>200.380</td>
<td>0.017</td>
<td>1,937.29</td>
</tr>
<tr>
<td>V_BKS_FRV</td>
<td>46</td>
<td>0.005</td>
<td>0.006</td>
<td>-0.002</td>
<td>0.016</td>
</tr>
<tr>
<td>V_BKS_HISTC</td>
<td>48</td>
<td>0.050</td>
<td>0.312</td>
<td>-0.002</td>
<td>2.167</td>
</tr>
<tr>
<td>EPS_FRV</td>
<td>46</td>
<td>0.000</td>
<td>0.001</td>
<td>-0.003</td>
<td>0.003</td>
</tr>
<tr>
<td>EPS_HISTC</td>
<td>48</td>
<td>0.006</td>
<td>0.038</td>
<td>-0.003</td>
<td>0.265</td>
</tr>
</tbody>
</table>

The analysis of the Ohlson Model for the different periods of time is presented below. Specifically, Table 3 shows the results of the regression of the price on book value and earnings per share of companies that are valued with the historical cost, while Table 4 shows the results of the regression in companies that use the fair value method.

Table 3. Ohlson Model with investment properties at historical cost

<table>
<thead>
<tr>
<th>Variable</th>
<th>Period</th>
<th>Period</th>
<th>Period</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PRE_CRISIS</td>
<td>CRISIS</td>
<td>POST_CRISIS</td>
</tr>
<tr>
<td>LST_β(p)</td>
<td>(0.008)</td>
<td>(0.032)</td>
<td>(0.713)</td>
</tr>
<tr>
<td>V_BKS_HISTC</td>
<td>-1.215.051</td>
<td>2.010.771***</td>
<td>(0.295)</td>
</tr>
<tr>
<td>EPS_HISTC</td>
<td>9.974.808</td>
<td>5.813.748</td>
<td>(0.219)</td>
</tr>
<tr>
<td>Nº of Obs.</td>
<td>169.337</td>
<td>64.025</td>
<td>30.768</td>
</tr>
<tr>
<td>Prob&gt;F (p-value)</td>
<td>0.002</td>
<td>0.007</td>
<td>0.69 (0.63)</td>
</tr>
<tr>
<td>R² (R² adjusted)</td>
<td>0.050</td>
<td>0.005</td>
<td>0.28</td>
</tr>
</tbody>
</table>

Regarding the influence of earnings per share, it is confirmed that this variable is not significant to explain the listing of real estate companies at any time, regardless of whether historical cost or fair value criteria are used as valuation standard. This suggests that earnings per share is less relevant for investors, regardless of whether the company uses fair value or historical cost as a criterion to value its investment property. Although in the post-crisis era, greater relevance of the historical cost in terms of earnings per share could be expected, given the orientation to earnings figures versus balance sheet figures of this criterion (Acaranuponj, 2017; Beisland & Knivsfla, 2015), in both cases earnings per share is not decisive to explain the listing of real estate companies in the market. In the case of fair value, the lack of relevance of earnings per share in line with the literature that defends that the fair value is perceived with greater utility to predict cash flows but not to predict earnings (Ehaliayi et al., 2017; Lev et al., 2010; McInnis et al., 2018), given its greater orientation to equity (balance) figures versus earnings figures (Beisland & Knivsfla, 2015; Danbolt & Rees, 2008).

Regarding the book value, the results in Table 3 indicate that the book value in companies whose investment properties are valued by the historical cost model has a positive and statistically significant influence on the market price of these companies in the post-crisis period ($β_1=2,010.771; p=0.002$). Therefore, the book value of companies that used the historical cost criterion is relevant for the investor to explain their market price in the post-crisis period.

The results about book value under the fair value method (Table 4) are quite better for this criterion. The book value of companies that use the fair value model is not significant to explain their market price only in pre-crisis period. However, it is important to note that the small number of observations compromises the predictive power of the model in the pre-crisis period. In the crisis period, opposite to the historical cost criterion, the book value of those companies in the sample adopting the fair value criterion is significant to explain the valuation of the companies in the market at 5% ($β_1=3,622.006; p=0.017$). Moreover, the model, which is globally acceptable $(\text{Prob}>F=0.01)$, also shows a considerably high estimation power (R² (R² adjusted) = 0.69 (0.63)), thereby confirming the ability of the fair value model to fit information in convulsive periods to an accurate valuation (two of third parts of share price valuation is explained by accounting information relative to book value of firms adopting fair value criteria). Hence, the adopted criterion for investment properties valuation makes a difference in periods of higher instability in the economy, being perceived as more relevant for investors the accounting information under the fair value valuation over the historical cost one, and with greater es-
timation power (0.69 versus 0.26 in terms of R2). These results are in line with studies that empirically proved the better perception of information by investors when accounting information has been disclosed under fair value criterion (Hitz, 2007; Lev et al., 2010; Tahat et al., 2016). This fact can be explained by the fact that, although the fair value criterion could decrease the relevance of earnings, it does increase the relevance of Balance Sheet information (Beisland & Knivsfja, 2015; Danbolt & Rees, 2008) due to a better matching of accruals (Dichev & Tang, 2008) and a higher predictability of cash flows (Argulés et al., 2011; Ehalaïye et al., 2017; He et al., 2018). Such perceived relevance of information under fair value criterion is also reflected (even in a stronger way) in the post-crisis period. As observed in Table 4, the book value of companies that opt for fair value in post-crisis is positive and statistically significant ($\beta_1=1,001.672; \ p= 0.000$), increasing the relevance of this financial information for the investor when explaining the company's price. Furthermore, the explanatory power is also high, being explained share price by book value accounting information under fair value criterion on more than 80% ($R2 (R2 adjusted) = 0.84 (0.83)$).

In conclusion on both criteria, the results confirm the similar behaviour regarding the relevance of the historical cost and fair value criteria for investment properties (Hassan et al., 2006; Machado & Machado, 2013; McInnis et al., 2018) in present times (post-crisis period), despite the superiority of fair value criterion in the crisis period. This represents a contribution to the literature on accounting election for investment properties, a kind of assets that has been less empirically studied (Selhorn & Stier, 2019) and that particularly affected by the election between the two valuation models (Gosh et al., 2020). In this sense, for companies with investment properties it is appropriate the trending stream of accounting literature that points to the advantages of combining the relevance of fair value and the reliability of historical cost, establishing a dual system that allows taking advantage of both qualities. This would increase the relevance of financial information for investors, as evidenced for other types of companies (Paleza, 2014; Rashad Abdel-Khalik, 2010).

However, our results also suggest that the use of the fair value method reduces the asymmetry of the information compared to the historical cost method in post-crisis times, as evidenced by a higher coefficient in the case of historical cost ($\beta_1=2,010.771$ vs. $\beta_1=1,001.672$). This would be in line with recent results that confirm a negative relationship between the extent of fair value disclosures and the bid-ask spread in the stock markets (Vergauwe & Gaeremynck, 2019).

6. Conclusions

The tension between two main qualities of financial reporting, reliability and relevance, has been extensively studied by previous research. The study of the relevance of fair value on the markets, finds its foundation precisely in the relevance vs. reliability balance. However, the evidence shows inconclusive results, or even suggests loss of relevance of the financial information with the use of the fair value method versus the historical cost method.

In this sense, our analysis evidences differences between the valuation criterion in terms of perceived relevance by investors depending on the economic circumstances. In convulsive periods, as it happens in a crisis, investors perceived as more relevant the fair value criterion (which updates accounting information, making it be in line with market information) versus historical cost criterion (which shows the initial recognition values, which may considerably differ from the volatile values in the stock market). Hence, investors prefer values that are more alike to market conditions to compensate the instability of the economic environment. However, whenever the situation is somewhat more stable, results confirm a similar explanatory power of the financial information on the listing of real estate companies, regardless the use of a valuation model for investment properties based on historical cost or fair value. The study also highlights the greater utility for share price prediction of the Balance Sheet information versus the income one, as evidenced by earnings per share being not significant throughout the study period, neither in times of economic growth nor in times of crisis.

However, our results find evidence of the increased relevance of the financial information provided by the equity of real estate companies just in the years after the economic crisis. This suggests the tendency towards increasing the relevance of book value for decision-making for users of financial information in capital markets. Thus, both under the historical cost model and the fair value model, equity comes to have a significant explanatory power for the market price, although a reduction in the asymmetry of financial information in favour of the fair value method is suggested.

The present study contributes from the empirical point of view to treat the evolution of the perception of relevance of financial information for the capital market investor in a type of assets less empirically studied such as investment properties. As an implication for the accounting regulator, it is suggested to combine the advantages of historical cost and fair value in the real estate sector, in a possible dual valuation system, as the literature already indicates for other types of companies.

The main limitation of this study comes from the small number of observations of companies that measures through the fair value method at the beginning of the analysed period. This is due to the transition period for election between historical cost or fair value criterion, from the mandatory implementation of international accounting standards in Spain in 2005. Anyway, future lines of research may extend the study period in order to have a broader view of the behaviour of the two valuation models. Further research, as well, could be oriented towards a comparative study with other European countries about the optionality of IFRS 40, as well as the possibility to include the fair value in the annual report of those firms who adopt historical cost criterion for investment valuation. These two lines of research may be interesting to have a broader view on the behaviour of the two valuation criteria, thereby serving as a way to overcome the limitation of sample size in our current research.

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Conflict of interests

The authors declare no conflict of interests.
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