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The Impact of IFRS 16 on Key Financial Ratios: a New Methodological Approach

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The Impact of IFRS 16 on Key Financial Ratios: a New Methodological Approach

ABSTRACT In January 2016, the IASB issued a new standard for lease accounting (IFRS 16). IFRS 16 will lead to the capitalisation of the majority of current operating leases by lessees. We analyse the impact of the new accounting model on entity’s key financial, contributing to research by making significant changes in the Imhoff et al. (1991, 1997) methodology used by previous authors. We change how the lease term is estimated (more aligned with the final approved standard), and how the discount rate is obtained. Furthermore, we use a more comprehensive sample (646 quoted European companies). In line with previous research we find important systematic impacts on key balance sheet financial ratios (mainly leverage ratios), on a magnitude that depends on the operating lease intensity of the sector in which the entity operates. Our estimated impact is generally higher than that obtained in previous studies. The most affected sectors are retail, hotels and transportation. We do not find a consistent result with regard to the effect on profitability ratios.

Keywords: IFRS 16, Lease Accounting, Financial Ratios, Impact Assessment.

JEL Codes: M41.

1. Introduction

Leasing is a very mature product in the international market as well as in all European countries, and has been used by economic agents for many centuries, for a brief history of lease transactions see Taylor (2011). For over five decades, leases have been offered by specialised companies (financial or lease companies) as an alternative to traditional financing of products (that is, as an alternative to carrying out the financed purchase of the underlying asset). Leasing is regularly used by all sector entities as an important source of funding, encompassing the leasing of all kinds of goods from machinery to real estate or laptops. By way of example of lease volume (with reference to certain specific goods only), according to the European Rental Association (EAR), “the equipment rental market in the EU-28 and the European Free Trade Association (EFTA) countries grew to
€23.06 billion in 2014 at constant exchange rates – a growth of 1.9% compared with 2013” (ERA, 2016); according to Leaseurope (leasing and automotive rental association) “the portfolio of leased assets (outstanding) in Europe grew by 1.7%, reaching €729.6 billion at the end of 2014” (Leaseurope, 2015); and according to the European Public Real Estate Association (EPRA), the size of the total real estate market in Europe by September 2015 was €8,095.77 billion (EPRA, 2016).

In January 2016, the International Accounting Standards Board (IASB) issued a new standard on lease accounting that will become effective for annual reporting periods beginning on or after 1 January 2019 (International Financial Reporting Standard – IFRS 16 – Leases). The US Financial Accounting Standards Board (FASB) issued an equivalent standard in February 2016 (Accounting Standard Update No. 2016-02, Leases (Topic 842)), with the same effective date.

IFRS 16 will introduce a great change in the accounting model applied by lessees (maintaining basically the same current accounting rules for lessors). Under current International Accounting Standard (IAS) 17, lessees must classify all lease operations in two categories: operating leases and finance leases. Operating leases are just recognised as an expense to be deferred over the lease term, while, under the finance lease model, lessees recognise the leased asset in the balance sheet, as well as a debt (the lease operation is accounted for as a purchase of the leased asset). The new standard will lead to the capitalisation of the majority of current operating leases by the lessees i.e. a model similar to financial leases will be applied for all leases under the IFRS 16 scope without distinguishing between operation and financial leases, with some voluntary exceptions (short term leases and low value assets).

This model change for operating leases is expected to have an important effect on entity’s financial statements as new assets and liabilities will be recognised. Moreover,
all metrics that use financial statements as a basis will also change. In this context, the objective of this paper is to analyse the impact of lease capitalisation on key financial ratios determining the sectors that may be more affected. This has been analysed by previous authors, but we introduce significant changes to previous methodology and also use a wider and more comprehensive sample.

Previous research on leases has extended over several decades, as shown by Morais (2011) who notes that lease accounting has been a controversial topic since US regulators issued the first lease standard in 1949. Lease accounting research can be classified in several strands (see section 3). One of these, in which there has been growing interest since the Boards started the current lease accounting reform, is focused on analysing the impact of lease capitalisation on key financial ratios. Authors conduct an impact research in order to analyse the main changes in accounting ratios and other metrics that users of financial statements will face once the new lease standard is implemented. They generally follow the *constructive method* introduced by Imhoff Jr. and Lipe (1991, 1997), that consists on discounting future minimum lease payments disclosed in the notes to the financial statements. All of these studies show how leverage, profitability and other ratios are affected by the capitalisation of operating leases, with differences depending on the sample used (Bennett & Bradbury, 2003; Duke, Hsieh, & Su, 2009; Durocher, 2008; Fitó, Moya, & Orgaz, 2013; Fülbier, Silva, & Pferdehirt, 2008; Goodacre, 2003; Grossman & Grossman, 2010; Imhoff Jr. & Lipe, 1991, 1997; Mulford & Gram, 2007; Singh, 2012)\(^1\).

These studies were conducted before final IFRS 16 / Topic 842 were issued, and therefore do not consider relevant aspects of the final standards that influence lease asset and liabilities as how lease term has been defined. Moreover, they use simplifications for important aspects like the discount rate to be applied for calculating initial right of use (lease asset) and lease liability value.
Our study contributes to the literature in several ways. Firstly, we estimate the profit and loss impact following the final model included in IFRS 16 (which does not differentiate between type A and type B leases as were described in the previous IFRS 16 drafts and projects). Secondly, we do not discount the “minimum lease payments” disclosed by the companies under IAS 17 in order to calculate the amount of the new liability (as previous authors do). We estimate future lease payments in a different way, using average contract life disclosed by some companies along with information obtained directly from other companies (see sections 4.3 and 4.4). Thirdly, we use an advanced model in order to adjust the discount rate to be used for each company within the sample (depending on several factors such as the company’s rating and sector, and considering the recovery rate from the collateral) (see section 4.5).

Finally, we select a sample of 646 European quoted companies from a variety of sectors. This sample gives us a more realistic view of the global impact of IFRS 16 on one of the main areas of IASB influence, differentiating the economic effects by sector (see section 4.1).

The remainder of this paper is organised as follows: in section two we describe lease accounting reform, and in section three we include a review of previous research on lease capitalization. Sections four to six are dedicated to our empirical research. Section four includes a description of the hypothesis and section five includes a summary of the research methodology used, highlighting changes in relation to methodologies used in previous research. The main results are included in section six. Finally, section seven contains our general conclusions.
2. Lease accounting reform

2.1 Evolution of IAS 17 model

Current lease accounting model was introduced through a FASB standard issued in 1976 (more than 40 years ago): Statement of Financial Accounting Standard (SFAS) 13 “Accounting for Leases” (FASB, 1976) (now Accounting Standard Codification 840). In IFRS context, current standard (IAS 17) was issued in 1994 by the former International Accounting Standards Committee (IASC) (including a model similar to SFAS 13).

The IAS 17 and SFAS 13 model has been criticized by academics (Reither, 1998), practitioners (AICPA, 1994), and users (Vivien Beattie, Goodacre, & Thomson, 2006), who argue that entities are not recognising all lease obligations and assets in their balance sheets, which leads to a lack of comparability. As stated before, under IAS 17 and SFAS 13, and from the lessee perspective, if a lease is classified as a financial lease (capital lease under US GAAP), the operation is recognised as a financed purchase. On the contrary, if the operation is classified as an operating lease, it is not recognised in the balance sheet at all (except for accrued lease rent payable). These are known as "off-balance sheet" leases.

The fact that many leases are recognised as an "off-balance sheet" operation involves difficulties when comparing financial statements and financial ratios among companies in relation to metrics such as total debt level. If one company decides to buy certain goods (financing the purchase by issuing a loan) and a second company decides to lease the same goods, in economic substance both operations may be very similar. Nevertheless, under current accounting standards (IAS 17 / ASC 840), the first operation is recognised as a financed purchase and the second may not be recognised at all if it is considered to be operating lease (apart from lease expense and the accrued lease payable).
Duke et al. (2009) indicate that companies have enjoyed the benefits of operating leases for decades since both leased assets and liabilities can effectively be kept off the balance sheet with only footnote disclosures of future lease obligations. Many authors find that companies (lessees) structure lease transactions in order to be able to maintain lease commitments off-balance sheet, i.e. in order to be able to consider the leases as operating (see, for example, initial research by Abdel-Khalik (1981) in relation to the SFAS 13 model, and also Duke et al. 2009; Beatty et al. 2010; Bryan et al. 2010; Dechow et al. 2011; Cornaggia et al. 2011). Cornaggia et al. (2011) find that, as a proportion of total debt, operating leases used as fixed-cost financing for US corporations increased by 745% from 1980 to 2007 and capital (on-balance-sheet) leases fell by half.

Empirical evidence also supports that off-balance lease liabilities (i.e. liabilities that would arise if operating leases disclosed in the financial statements footnotes were capitalised) are, in some cases, considered by market participants. According to Sakai, (2010), the market appears not to react to lease capitalisation, but Lindsey (2006) shows that operating lease liabilities are considered real liabilities from an economic perspective by investors, and that market participants price them differently from financial leases. These commitments have the same risk impact on valuation models as financial leases (Dhaliwal, Lee, & Neamtiu, 2011). For credit investors, operating leases not disclosed in balance sheets are incorporated into debt ratings and bond yields (Lim, C. S., Mann, C. S. and Mihov, 2003; Sengupta & Wang, 2011).

The reform of the lease accounting model (SFAS 13 and IAS 17) has been under discussion for several years. The first document jointly prepared by several accounting issuers (G4+1, including the former IASC and the FASB) proposing the possibility of capitalising operating leases (i.e. proposing to change the current model), was issued as early as 1996 (McGregor, 1996). The process accelerated in 2005 when the US Securities
and Exchange Commission (SEC) recommended that the accounting guidance for leases be reconsidered (SEC, 2005). During IASB meetings in 2006 (March and April), the possibility of incorporating leases into the agenda was discussed. Finally, an IASB-FASB joint project was approved in July 2006. Since then, the IASB and the FASB have started working together on a new lease accounting standard (lease accounting joint project).

Throughout the project, the Boards concluded (in line with previous studies) that, although when entering into a lease contract it can be argued that for operating leases, the lessee immediately obtains an asset (the right of use of the leased good) and a liability (the obligation to pay future lease rental), this asset and this liability are not recognised in balance sheet in most cases.

In this context, the boards (IASB and FASB) began to develop a new accounting model for leases in which lessees would reflect most of their lease obligations in the balance sheet (that is, very few off-balance sheet lease operations would remain after its implementation by companies). The first proposal for the new model (i.e. the first draft standard) was issued by the IASB in 2010, and subsequently a revised draft was issued in 2013. Throughout the process, many voices were raised against the lease accounting model change, especially among financial statement preparers, as can be seen in the response letters to the exposure drafts (Barone, Birt, & Moya, 2014; Molina & Mora, 2015). In fact, the IASB itself acknowledges (in the documents accompanying the issuance of IFRS 16) that “some preparers questioned the benefit of reporting all leases on the balance sheet”. Several media specifically referred to the fact that in 2010 several Spanish companies (including Santander, BBVA, Inditex, Telefónica, Iberia, Repsol, NH Hoteles and El Corte Inglés) lobbied against the IASB in order to avoid changes to the IAS 17 model. They were even supported by the Spanish Ministry of Economy, and partially by the European Commission (Expansión, 2016; Fitó et al., 2013). These
companies argued that in the context of a general economic crisis, an increase of balance sheet debt would make ratings decline, increase cost and impact on investment levels. They also claimed that there is a difference between a loan (that must be paid in order to eliminate the commitment) and many leases in which an entity is able to leave the contract freely at any moment (without paying any fee or, in some cases, just a penalty fee).

Despite these arguments, the boards finally concluded that the benefits of the new model for investors and users of financial information were greater than the costs. In fact, approximately half of the letters received as a response to the EDs supported the project based on the argument of increased information quality (Fitó et al., 2013). As stated before, IASB issued the final standard (IFRS 16) in January 2016, and the FASB issued its standard in February 2016 (ASU No. 2016-02, Leases (Topic 842)) with a long period until mandatory first application (2019 under IFRS 16, and 2019 or 2020 under US GAAP depending on whether or not the company is a Public Business Entity), in order to allow both financial statement preparers and users to adapt to the new model.

2.2 IFRS 16 model for lessees

The most important change under IFRS 16 in comparison to IAS 17 will be, as introduced before, the new accounting model to be applied by lessees. Typical examples of sectors with high volumes of operating leases not currently recognised in the balance sheet are retail (real estate leases), airlines (aircraft leases), hotels (hotel leases), and telecommunications (networks and other assets).

Under IFRS 16, when an entity enters into a lease contract (as a lessee), it will recognise a right-of-use (asset) and a debt (lease liability), although there are voluntary exceptions for short term leases (less than one year) and leases of low value assets (USD 5,000 or less). The lease liability is initially recognised as the present value of future lease payments during the lease term. Right-of-use is initially recognised as an amount equal
to the liability plus other concepts such as the lessee’s initial direct costs; prepayments made to the lessor; estimated costs of restoration, removal and dismantling; and less any lease incentives received from the lessor. For the subsequent measurement of lease liability, entities should accrue interest using the discount rate determined at lease commencement (provided that a reassessment and a change in the discount rate have not occurred), and reduce lease liability by payments made. Right-of-use is subsequently amortised following IAS 16 principles and impaired following IAS 36. The revaluation / fair value model included in IAS 16 and IAS 40 can also be applied in certain cases for subsequent measurement of the right-of-use. According to IFRS 16: if a lessee applies the fair value model in IAS 40 Investment Property to its investment property, the lessee shall also apply that fair value model to right-of-use assets that meet the definition of investment property in IAS 40. If right-of-use assets relate to a class of property, plant and equipment to which the lessee applies the revaluation model in IAS 16, a lessee may elect to apply that revaluation model to all of the right-of-use assets that relate to that class of property, plant and equipment.

Two important concepts in relation to this model that may affect the measurement of the lease asset and liability are the lease term and the discount rate.

The lease term is a concept wider than that which is currently known as the non-cancellable period of the lease. It is an estimation of the lease maturity including the possible exercise of cancelation or extension options (if that exercise is “reasonably certain”). This is the reason why in some cases, the use of current minimum lease payments disclosed by entities under IAS 17 (and used by many authors in previous studies, see section 3) may not be a valid proxy for estimating future lease payments under IFRS 16. The estimation of lease term can change during the lease contract’s life. If there
is a change in lease term, the entity should discount new cash flows (considering the new term) using an updated discount rate.

On the other hand, the discount rate is the interest rate implicit in the lease, but only if that rate can be readily determined (which may not be the case in many cases due to the lack of information concerning the fair value of the leased asset, the direct cost incurred by the lessor or the residual value). If the interest rate implicit in the lease cannot readily be determined, the lessee’s incremental borrowing rate at the measurement date may be used. We assume that the interest rate implicit in the lease is not an information that is always available to the lessee and that the lessee’s incremental borrowing rate will be used in many cases. This is the rate at which the lessee would receive a loan for acquiring the leased asset considering aspects such as the fact that the loan is secured (by the leased asset), the credit quality of the lessee and the lease term.

Finally, there are some differences between IFRS 16 and Topic 842 model. Under IFRS 16, there is one single accounting model for all capitalised leases (as seen above). Under Topic 842, there are two accounting models depending on whether the lease is an operating lease or a finance lease. In an operating lease, expense recognition is made on a linear basis and in a finance lease expense recognition is made as in IFRS 16. Another relevant difference is that under US GAAP, the voluntary exception for low value assets does not apply.

3. Literature Review

3.1 Analysis of main recent research papers

Accounting research on leases, as mentioned in the previous section, extends over several decades. Morais (2011), conducted a comprehensive literature review including more than 80 papers and categorised them in the following five areas: economic consequences
of accounting standards, determinants of leases, value relevance, leases’ valuation and the impact of leases on accounting ratios (see also Barone et al., 2014). Our study may be included in the last of these lines of research since we estimate the impact of IFRS 16 on companies’ financial statements and we analyse how the most widely used accounting metrics and ratios will change for each relevant economic sector.

We find two methodologies for capitalising off-balance sheet leases in the accounting literature: the constructive method and the factor method. Both methodologies estimate, in different ways, how balance sheet and profit and loss account would change if operating leases had been recognised in the balance sheet.

The constructive method was first used by Imhoff Jr. & Lipe (1991, 1997), and since then it has been widely used by many authors. It is based on the information that companies disclose in the operating leases note included in their financial statements. Companies disclose total future minimum lease payments under non-cancellable operating leases for each of the following periods: no later than one year, later than one year and not later than five years, and later than five years (see IAS 17.35). Under US GAAP (see ASC 840, 50.2), payments from year one to year five are generally disclosed per year. This information is used to reconstruct the balance sheet and the profit and loss account. Some assumptions should be made: total lease life (over year five), payments structure (from year one to year five if aggregated, and beyond year five), discount rate, tax rate, etc.

Imhoff et al. (1991, 1997) and Durocher (2008), among others, use the following approximation (either for calculating a global average or on a case by case basis): they divide the aggregate lease payments beyond five years by the lease payments in the fifth year to approximate how many years the payments would continue at the level of the fifth year payment. This estimate is rounded up to the next whole year. The aggregate lease
payments beyond five years are then divided by the rounded up number of years in order to obtain the assumed uniform amount to be paid after the fifth year. The present value of remaining lease payments is the balance sheet amount of the lease liability. Mulford & Gram (2007) use a similar approximation. They also divide the aggregate lease payments beyond five years by the lease payments in the fifth year. The midpoint of the resulting time frame is used in computing the discount period for the remainder of the lease payments. The total discount period for present value calculations is computed by adding the first five years of the lease term to the calculated midpoint of the term beyond year five.

Further, the capitalised asset and liability are generally assumed to be different by authors. The asset is amortised on a linear basis since inception and the liability is accounted for as a loan. Imhoff et al. (1991, 1997), Duke et al. (2009), Singh (2012) or Wong & Joshi (2015) assume the asset value to be around 70%-75% of the lease liability for the whole sample (which implies an average total life of 25 years, with 15 years remaining, at an interest rate of 10%). Other authors such as Durocher (2008) estimate the average total life of leased assets for each company in order to calculate their current value. They divide the total accumulated amortisation of the company’s non-leased assets by the total cost of the same assets so as to calculate the expired life percentage (the difference with 100 being the unamortised proportion). The total life of leased assets is the remaining life of the liabilities divided by the remaining life percentage. Once the average total life of leased assets is obtained, they calculate a percentage that represents the average relationship between assets and liabilities at the current point of the asset’s life.

In relation to the profit and loss account, many authors follow Imhoff et al. (1997) and calculate the effect simply by comparing modified balance sheets (including capitalised
leases) at the beginning and the end of the year. Other authors remove lease expense under current standards and calculate lease asset amortisation and interest expense for the year.

In order to calculate the annual depreciation expense, Mulford & Gram (2007) divide the aggregate lease payments beyond five years by the lease payments in the fifth year, add five to that figure and then divide by two. They divide the net present value of future lease payments by this final figure.

In relation to payment structure, authors generally assume a constant decrease from year one to year five (if this information is aggregated) (Fülbier et al., 2008).

The discount rate is sometimes assumed to be constant for the whole sample. Imhoff Jr. & Lipe (1997) used a 10% rate, and since then many authors have used the same or a similar rate (Beattie, Edwards, & Goodacre, 1998; Bennett & Bradbury, 2003; Duke et al., 2009; Ely, 1995; Singh, 2012; Wong & Joshi, 2015). They conclude (by performing sensitivity analysis) that both uniform and firm-specific assumptions result in similar estimates of the unrecorded lease liabilities and assets. Other authors take discount rates used by companies for pensions and other provisions (Fülbier et al. 2008 or Pardo et al. 2015). Finally, a third group use a 10 year Treasury bond rate or other “risk free rate” and add a spread depending on the company’s credit quality (see for example, Mulford & Gram 2007; Durocher 2008; Fitó et al. 2013).

The second methodology for capitalising off-balance sheet lease payments is the factor method. This method is widely used by rating agencies such as Moody’s (2015) in order to estimate entities’ debt that arises from off-balance sheet leases. It basically consists of multiplying current lease expense by a certain multiple, which differs according to sector. The result is an estimation of the present value of the total future minimum lease payments. This method is less used in the accounting literature. Some authors use it in order to compare results with the constructive method (see for example, Fülbier et al.
This method may be seen as more aligned to market assumptions. Rating agencies use it for calculating credit ratings and many market agents make their economic decisions based on these ratings. In this sense, their method represents market expectations regarding future requisite payments.

Once operating leases have been capitalised (using either the constructive or factor method), authors analyse the magnitude of changes in accounting ratios and other metrics. Ratios are generally divided into three groups:

1. Ratios and metrics related to the structure of the balance sheet. For example: total assets and liabilities, \( LA (\text{Debt} / \text{Assets}) \), \( LE (\text{Debt} / \text{Equity}) \).
2. Performance ratios. For example: Return on Asset (ROA), Return on Equity (ROE).
3. Investment return and other ratios. For example: Earnings per Share (EPS), Current Ratio, EBITDA.

The most recent relevant studies in relation to an ex-ante impact analysis of lease capitalisation (encompassing the period from 2007 to 2016) are those by Mulford & Gram (2007), Durocher (2008), Fülbier et al. (2008), Duke et al. (2009), Singh (2012), Grossman & Grossman (2010), Bryan et al. (2010), Fitó et al. (2013), Wong & Joshi (2015) and Pardo et al. (2015). The empirical evidence of these studies (and other studies issued prior to 2007) generally shows that operating leases result in off-balance sheet financing, earning enhancement and improvement in ratios like debt to equity (leverage) or ROA. The most relevant results are shown in Table 1. Quantitative results differ depending on the sample used (general or focused on one or more sectors), the methodology used (constructive or factor method, or both) and the ratios analysed, etc.

[INSERT Table 1 HERE]
3.2. Hypothesis development

We analyse the impact of adopting IFRS 16 on leverage, profitability and solvency ratios, testing our first null hypothesis:

\[ H_{0.1} \]: The adoption of IFRS 16 will not have a significant impact on balance sheet (increase in assets or liabilities, lease expense over liabilities and leverage), profitability (ROA) and solvency (coverage) ratios of European quoted companies.

Previous literature shows that some sectors use operating leases more extensively. In these sectors, operating leases are used as an alternative to intense capital investment, giving companies the advantage of a more flexible structure. This is very common, for example, in the retail industry (food retail, clothes retail, etc.), in which real estate goods (retail shops and business locations) are leased. In fact, the retail industry is generally the sector identified in previous papers as that which is most affected by the implementation of the new lease accounting model (Altamuro, Johnston, Pandit, & Zhang, 2012; Durocher, 2008; Fitó et al., 2013; Fülbier et al., 2008; Mulford & Gram, 2007). Other affected sectors (identified as lease-intensive industries (Fitó et al., 2013)) are hotels and transportation. In our research, and in order to ensure the objective identification of the most operating lease-intensive sectors, the ratio operating lease expense over liabilities (\(Leas.\ exp/Liab\)) was constructed (see Table 5). Moreover, proactive lobbying against new accounting models for leasing operations was led by major companies in sectors such as retail and hotels. Within this context, the following second null hypothesis is proposed:

\[ H_{0.2} \]: The impact of IFRS 16 on key financial ratios does not depend on the sector in which the company operates.
4. Data Selection and Research Design

4.1 Data Selection

We select all European quoted companies included in the STOXX Total Market (Datastream mnemonic: LDJTMSTE). This gave us an initial sample of 1051 firms. However, some companies are removed from the sample for the following reasons (see Table 2):

- 335 companies are removed because they did not show operating lease expense in their financial statements.
- 16 companies alter the results because their characteristics do not match with the general characteristics of the companies included in the defined sectors (see Table 2). This generally occurs because they have very diversified activities.
- 54 companies show extreme values in relation to the rest of the sector which significantly alter the median. These companies were removed when their ratios were three times outside the interquartile range. Results did not change if a lesser distance was considered.

Following the removal of these companies, we have a final sample of 646 companies.

Sample description and data source are included in Table 2. Sector analysis is carried out using 4 digits GICS (Global Industry Classification Standard).

[INSERT Table 2 HERE]

4.2 Research Design

As previously explained, we design a new capitalisation method that better adapts to the final requirements of IFRS 16. In the following subsections we will describe how we estimated the amount of the new assets, liabilities and expenses that will arise from operating lease capitalisation, i.e. how we calculated future lease payments and how we obtained the discount interest rate, etc.
Once we estimate new accounting figures, and in line with previous literature, we test our hypothesis by comparing the mean of several ratios and metrics levels before and after operating lease capitalisation (for the total sample and for each sector). See section 4.6 for further explanation in relation to the analysed ratios and metrics. In order to measure the relative variation of each ratio, comparability indexes are be calculated using the following equation (Fitó et al., 2013):

$$C_i = \left\lfloor \frac{R'_{i} - R_i}{R_i} \right\rfloor$$

(1)

Where:

- $R'_{i}$ is the financial ratio level after adopting IFRS 16 for company $i$.
- $R_i$ is the financial ratio level before adopting IFRS 16 for company $i$.
- $C_i$ is the comparability index for company $i$.

The significance of means may present some problems as ratios generally do not follow a normal distribution, as explained by Fülbier et al. (2008) or Fitó et al. (2013). In order to analyse this effect, the non-parametric Wilcoxon test is calculated for financial ratios and the t-test is run for indexes. The effect on each sector is observed by calculating the ratios and metrics for each sub-sample.

4.3 Measurement of assets and liabilities from operating leases

Previous literature has basically used the constructive method in order to calculate lease asset and liability that would arise under the new model (Beatty et al., 2010; Durocher, 2008; Fitó et al., 2013; Goodacre, 2003; Imhoff Jr. & Lipe, 1991). Authors discount future minimum lease payments disclosed by companies in the notes to financial statements in order to obtain the lease liability (that is to say that generally the lease asset developed from that figure is as a percentage of the liability).
IFRS 16 defines the lease term as including not only the non-cancellable period, but also any additional period (considering options to extend the contract or cancel the contract) during which the entity expects to maintain the use of the leased asset. In many cases, therefore, what companies currently disclose under IAS 17 in the notes to financial statements may not be representative of total payments that should be discounted under IFRS 16, especially in those sectors in which the IFRS 16 impact is expected to be high.

We can take as an example two peer European quoted companies from the food retail sector: Ahold and DIA, in which the most important leased assets are the stores (real estate). Ahold had an operating lease expense of €823 million (excluding contingent rentals) in 2015 and disclosed future minimum lease payments of €6,140 million, which leads to an average lease life of 7.4 years. DIA had an operating lease expense of €307 million in 2015 and disclosed future minimum lease payments of €212 million, which leads to an average lease life of 0.7 years. In all likelihood, the average period for which both companies expect to maintain store lease contracts is higher than 7.4 and 0.7 years. This only represents the non-cancellable period, which is influenced by factors such as how real estate lease contracts are stabilised in each country. An example of a peer company for which disclosed figures could be closer to the IFRS 16 lease period is Tesco. Tesco had an operating lease expense of £1,160 million in 2015 and disclosed future minimum lease payments of £20,876 million, which leads to an average lease life of 18 years. In line with these considerations, we have not used future minimum lease payments disclosed by the companies in order to calculate lease asset and liabilities. In this sense, we have used a methodology which is closer to the factor method than to the constructive method. This is because we have not discounted minimum lease payments as disclosed in the entity’s financial statements, but we have use a factor for each sector that is multiplied
by the lease expense (see section 4.4). The factor is a proxy of the estimated lease intensity of each sector.

First of all, and for each relevant sector in which there is a type of leased asset that represents the majority of the rental expense, we estimate the average expected life of an operating lease contract. We combine two types of information: financial statements information and information provided by certain companies to the authors.

On the one hand, we analyse notes to financial statements to see if companies disclose information regarding the lease contract’s total life (and not only the future minimum lease payments). For each relevant sector, we take at least five of the most important companies (considering total lease expense) as representatives of the sector. The most important sectors for this purpose are transport companies (such as airlines, etc. in which the leased asset is a “vehicle”); retail companies (food, clothes, financial, etc. in which the leased asset is real estate); hotels and other similar companies (in which the leased asset is real estate); oil and gas (in which the leased asset is machinery); industrial companies (in which the leased asset is machinery); power and utilities (in which the leased asset is land and equipment); and telecommunications (in which the leased asset is real estate/towers).

We find that some entities do provide information about the lease contract life. They generally disclose a minimum and a maximum life. In this case we have taken the average. By way of example, according to Inditex (clothes retail), “the leases have an initial term of between 15 and 25 years”; according to Telepizza (food retail), “the initial lease term of each contract is generally 10 years”; according to Ryanair (airline), “Ryanair’s aircraft operating lease agreements typically have a term of seven years (…)”; according to BP (Telecommunications), “operating lease commitments were mainly in respect of land and buildings (…). Leases have an average term of 16 years”; according to NH Hotel Group
(Hotels), “average life of operating lease contracts entered into by the Group is between 5 and 40 years”; and according to Telekom Austria (Telecommunications), “the operating lease contracts will expire on various dates through 2028”.

Further, we ask several companies within the sample to provide us with their estimation of operating lease contracts expected maturity. We obtain restricted information from at least one company in each major sector.

We construct an average per sector using all the information obtained. The results are shown in Table 3:

In the case of those companies not included in any sector in Table 2, we take the closest one depending on the most important lease asset in each case.

4.4 Lease liability and lease asset
The lease liability as at 31/12/2015 is obtained by discounting future operating lease payments.

Future operating lease payments were obtained as follows:

- We take lease expense for the current year included in the financial statements. We may assume that this is 100 currency units (c.u.).

- If the average lease term is 20 years, for example, we assume that there are 20 contracts, each of which matures in the following 20 years, i.e. one contract matures in 1 year, another matures in 2 years, etc.

- In this sense, payments for year 1 are 100, payments for year 2 are 95 (= 100 – 5), payments for year 3 are 90 (= 100 – 10), etc., and payments in year 20 would amount to 5 c.u.
The asset value is assumed to be approximately 90% of the value of the liability. This is calculated by analysing the accounting difference between the asset and the liability in the mid-life of a 17 years lease using a discount rate of 3%.

Lease expense under IFRS 16 (considering both asset depreciation and interest expense) is assumed to be 100% of current expense considering the same average model as above.

4.5 Interest rate
We use a new model in order to estimate a discount rate that is better adapted to the credit risk inherent in the financial operations we are analysing (considering both the company’s specific risk and the characteristics of the lease contract).

Firstly, we obtain the Bloomberg Euro interest rate curves per sector and rating (Bloomberg function: CRVF (Curve Finder) / CREDIT). These curves are constructed using bonds’ quoted yields to maturity. We obtain curves for the following sectors and ratings:

- Ratings: AAA / AA / A / BBB / BB / CCC.

These curves represent current average Euro senior yields for several maturities (from 3 months to 30 years) of the bonds issued by companies in a specific sector and with a specific public rating. In general terms, bonds are senior uncollateralized debts, i.e. the debt is not guaranteed by specific goods, whereas lease operations are collateralised by the leased goods. If the lessee does not meet their payment obligations, the lessor repossesses the leased asset (and recovers the residual value of the asset at that point in time). Therefore, curves should be adapted to this fact. Secondly, we adapte the curves in order to represent collateralized debt by analysing changes in 5 year CDS spread when
changing the Recovery Rate (R) parameter. We select a quoted CDS for a representative company of each of the abovementioned sectors, and we obtain the PD (Probability of Default); the CDS Spread; the Recovery Rate (generally 40%); and the sensitivity to the basis point (Sp01). We change the Recovery Rate, and in order to see how the CDS Spread changes maintaining the same PD we use the following approximate formula:

\[
PD = \frac{Sp01}{(1 - R)} \times Spread
\]  

(2)

We apply the spread percentage change to the complete applicable yield curve (for example, if changing R the spread changes -3% in relative terms, the whole curve is moved -3% in relative terms). We carry out the same exercise for several recovery rates depending on the leased goods. The recovery rates used are obtained from Hartmann-Wendels et al. (2014) for the following goods: Vehicles, Machinery, ICT (Information and Communications Technology), Equipment and Other (generic). For Mortgage (real estate: land and buildings), we use 80% in line with Ou et al. (2016). Table 4 shows examples of recovery rates in three sectors: energy (based on Iberdrola CDS), financial (based on Santander CDS) and generic (based on Klepierre CDS).

It can be seen that changes in yield curve for each type of leased asset are very similar in all sectors.

Considering the aforementioned methodology, we obtain multiple curves depending on three crossed characteristics for each company in the sample: rating, sector and principal type of leased asset. In Appendix 1 we include the main curves used in our sample. Finally, Appendix 2 shows, as an illustrative example, a detailed comparison between previous methodology and our proposed methodology for one company (Inditex). It this example it can be observed how the impact is greater following our proposed methodology; equity decrease (lease liability less lease asset) is greater.
4.6 Analysed ratios

In order to study the impact of the new lease accounting model and to be able to compare our results with previous literature, we analyse six ratios and metrics divided into three groups: a) balance sheet / leverage; b) profitability; and c) interest coverage. Table 5 shows how all the ratios were calculated as well as lease intensity measure.

[INSERT Table 5 HERE]

In relation to balance sheet / leverage, we calculate:

- The change in the figure for total assets (varAss).
- The change in the figure for total liabilities (varLiab).
- Leverage calculated as Debt / Equity (LE).
- Leverage calculated as Debt / Assets (LA).

Following Cornaggia, Franzen, & Simin (2012), apart from above mentioned ratios we also calculate lease intensity using the ratio Leas.exp/Liab (see Table 5). This is a measure of the expected impact of IFRS 16 on companies’ balance sheet. The higher the ratio, the higher the expected relative level of off-balance sheet finance.

In relation to profitability we calculate:

- ROA as net income less interest expense and after taxes divided by total assets (roa).

It should be noted that the method of calculating ROA in previous literature is not consistent among authors. Some authors such as Fítö et al., 2013; Fülbier et al., (2008) calculate ROA as EBIT divided by total assets or average total assets. Other authors such as Duke et al., 2009; Mulford & Gram, (2007) calculate ROA as net income (or income before taxes) divided by total assets or average total assets, i.e. they do not adjust interest expense in the ROA formula. Some authors even adjust the formula for excluding extraordinary items from the numerator (see Singh (2012)).
We believe that interest expense should be adjusted in the numerator since ROA represents the return that the company obtains from the assets independently of who has financed the purchase of said assets (Penman, 2007; Subramanyam & Wild, 2009). Moreover, after implementing IFRS 16, there would be a higher interest expense for the companies (in relation to the new lease liability) that should be also adjusted. Therefore, the return would seem higher (the increase in assets - the denominator - would also be higher).

In relation to interest coverage we have calculated:

- Interest coverage ratio as EBITDA / Interest Expense (COV).

This is a ratio widely used by analysts in order to study the relationship between generated cash flow and interest expense. The higher the ratio, the less risk the debt owners have since the entity generates sufficient cash flow in order to pay interest expenses.

As previously explained, our hypothesis are tested by comparing the mean of each financial ratio and the comparability index (as calculated in expression (1)) before and after IFRS 16 capitalisation. In order to contrast the significance of the means of ratios, we run both parametric and non-parametric ratios because of the non-normal distribution of many ratios (Barnes, 1987).

5. Main Results

5.1 Descriptive statistics
Mean, median (p50), standard deviation, minimum and maximum measures for all ratios defined in Table 5 are shown in Table 6 for the whole sample. In Appendix 3 we present the same information for all sectors.
In relation to lease intensity, a mean of 1.8% is shown for the whole sample, with a maximum of 9.8%. The less lease intensive sectors are banking and insurance (0.1%) and real estate (0.6%). The most intensive are foods and retailing (4.2%). Other prominent sectors are hotels (4.1%), transportation (3.7%), and commercial (3.2%).

The change of assets and liabilities after adopting IFRS 16 ranges from zero to a maximum of 84% for assets and 160% for liabilities. The sectors mentioned above show the least and the most change in assets and liabilities respectively. This analysis is most easily carried out using Table 7, because means are shown for all ratios with their asterisks of statistical significance, but ordered from the lowest to the highest Leas.exp/Liab ratio of each sector as a measure of lease intensity. Hence Table 7 will help us to accept or refute our second hypothesis.

[INSERT Table 6 and Table 7]

5.2 Whole sample

All means are shown together with their statistical significance. In general, Wilcoxon tests were run for financial ratios because they do not follow a normal distribution, and t-tests for comparability index ratios because they are normalized. Wilcoxon statistical significance (difference from zero) is shown for impact on balance sheet ratios (var.Ass, var.Liab and Leas.exp/Liab). This test was also run for leverage, coverage and ROA ratios, to test whether ratio prior to the adoption of IFRS16 was different to the same ratio following the adoption of this standard. In general, all means of ratios are statistically significant at 99% (some of them at 95%), except CI.ROA, as we explain below.

If IFRS 16 had been applied as at 31 December 2015, the total assets figure would have been 9.96% higher (mean) and the total liabilities figure would have been 21.4% higher (mean). The increase in total liabilities is greater fundamentally due to the following effects:
1) The total assets figure is greater than the total liabilities figure.

2) The lease asset (right-of-use) to be recognised is amortised on a linear basis and the lease liability to be recognised is amortised on an increasing basis (the interest expense being decreased over the lease life).

These results are higher than those obtained in the majority of previous studies. For example, Durocher (2008) obtains a mean increase of 5.6% in assets and 11.5% in liabilities (using a Canadian sample); Fülbier et al. (2008) obtain a mean increase of 8.5% in assets and 17.3% in liabilities (using a German sample); Duke et al. (2009) obtain a mean increase of 3.97% in assets and 11.13% in liabilities (using a sample from the United States); Pardo et al. (2015) obtain a mean increase of 3.54% in assets and 7.01% in liabilities (using a sample from Spain); while Wong & Joshi (2015) obtain a mean increase of 3.63% in assets and 4.48% in liabilities (using a sample from Australia).

We believe that the above difference is due to the change in methodology that we have introduced in our study, which implies higher lease future payments (see section 4). In order to apply the capitalisation method, authors simply discount the minimum lease payment as disclosed by the companies in their financial statements. However, under IFRS 16, entities will have to consider all lease payments over the complete lease term (as described in IFRS 16, which includes all estimated extensions of the lease contract), and not only the minimum lease payment, as considered by our methodology.

Moreover, our discount rate is generally much lower than the discount rate used by other authors which makes the present value of future lease payments higher. This is mainly due to the following factors:

- As at 31 December 2015, general interest rate levels were much lower than in previous years (the 12 months Euribor stood at 0.059%).
- We have introduced a change in methodology that adapts the interest rate to the credit risk of the specific company and recovery rate or leased assets (see 5.5).

It should be mentioned that some authors do obtain an average increase similar to the one we have obtained. For example, Mulford & Gram (2007) obtain an increase in assets of 14.6% and an increase in liabilities of 24.4%. However, they focus only on the retail industry and do not include a cross sector sample as we have done.

In Table 6, it can also be seen that leverage (LE) increases by 32.1% (mean) in relative terms. This is basically due to the new liability that arises when operating leases are capitalised. This figure is also higher than the figure obtained by other authors (see section 3), except in some cases like Singh (2012) where an increase of 107.6% is obtained (due to the fact that his sample is only focused on restaurants and retail firms), or Mulford & Gram (2007) who obtain an increase of 265.61% (because their sample is focused on the retail industry). In the next subsection, we will see that the IFRS 16 impact on leverage ratios varies widely depending on the sector.

Leverage over total assets (LA) is less impacted when measured as Debt / Equity (as shown in previous studies). This is because both assets and liabilities increase when operating leases are capitalised. Nevertheless, since asset amortisation is linear and liabilities capital amortisation is not linear (it increases over time), liabilities are generally higher than assets and the company shows a higher leverage. This leverage measure increases by 9.28% (mean) in relative terms.

In relation to ROA, we obtain an average ROA relative increase of 3.07% (which varies significantly according to each sector as we will see in the following subsection). Authors that use a similar methodology for ROA calculation also obtain an increase in this ratio (as opposed to a decrease). Durocher (2008) states that capitalising operating leases entails substituting amortisation and interest expenses for the rental expense, thus
affecting not only net income but also operating income before interest but after taxes. He obtains an ROA relative increase of 0.72%. Nevertheless, the significance of the mean of this ratio is only 90% and, moreover, we do not obtain consistent results in the set of sectors.

The majority of authors find a decrease in the ratio because of the increase in the denominator (higher liabilities due to lease capitalisation). Nevertheless, the return (nominator) is also affected and many authors do not consider this aspect (as seen in section 4.6). ROA should be calculated as net income plus interest expense divided by total assets (Penman, 2007; Subramanyam & Wild, 2009). Interest expense will increase since the new lease liability will have interest expenses. Therefore, both the denominator and the numerator increase. Moreover, in relative terms, the increase in the denominator is generally higher than the increase in the numerator.

Finally, we show a coverage ratio decrease of 13.6%. EBITDA increases but interest expense also increases. In general terms, interest expense increase is relatively higher (although lower in absolute terms) than the EBITDA increase.

5.3 Result by sector

Previous results, as set out in 6.1, vary widely depending on the sector within which the entity operates. Basically, those sectors in which the ratio lease expense divided by total liability (lease intensity) is higher will have a higher impact when adopting IFRS 16. In other words, sectors in which operating leases are more widely used as a financing product will have higher impact as previous studies have also shown.

In fact, Table 7 is organised using this ratio as a reference (the third column). Sectors with lower ratio levels are placed at the top and sectors with higher levels have been placed at the bottom. It can be seen that the higher the ratio lease expense divided by total
liability, the higher IFRS 16 impact is expected to be. Except for ROA, the ratios analysed are statistically significant at 99% in all sectors (some of them at 95%).

If we focus on the average increase in total liabilities and total assets, the three sectors with the highest increase are retail (27% in total assets and 59.2% in total liabilities); hotels (28.4% in total assets and 55.3% in total liabilities); and transportation (27.2% in total assets and 53.3% in total liabilities). In the retail sector, companies maintain lease contracts over real estate (commercial venues, stores, etc.). In the hotel sector, companies also maintain lease contracts over real estate (the hotel buildings). And in the transportation sector, companies maintain lease contracts over aircrafts, ships, etc. These are also the sectors with a higher lease expense / total liability ratio. In previous studies, these sectors are also the most affected by IFRS 16 implementation (Fitó et al. (2013) and Fülbier et al. (2008)).

It may be deduced, from the results and the figures used, that there are sectors in which companies maintain many operating lease contracts (with a high absolute lease expense under current standards) but, since their current leverage level is very high, the total effect of IFRS 16 is lower than in the retail, hotels and transportation sectors. The most representative example of this case is banking and insurance. They principally lease real estate (commercial offices) but due to the workings of their business and their balance sheet structure, they have a very high liability level (deposits from customers; deposits from other banks; bonds; insurance liabilities, etc.). In fact, the banking and insurance sector has the lowest average increase in total liabilities and total assets (0.7% for total assets and 0.9% for total liabilities). The banking and insurance sector includes companies such as BNP, Barclays, BBVA, Deutsche Bank, Unicredit, Societe Generale, Axa, Aegon, etc.
A further example is the Energy and Gas sector (4.5% increase in total assets and 10.5% in total liabilities). Companies in this sector lease machinery and land (for wind farms). The Energy and Gas sector includes companies such as BP, Enagas, ENI, Galp, Repsol, Saras, Gas Natural, etc.

Conversely, there are sectors in which current operating lease expense is not as high but which, since the total liability level (and, in general, the balance sheet size) is relatively low, will have a high impact. One example is the software and services sector. In fact, this sector is the fifth highest in terms of the increase in total assets and liabilities (14.1% for total assets and 33.6% for total liabilities). The software and services sector includes companies such as Amadeus, Cap Gemini, Indra, SAP, Worldpay, Sage, etc.

In relation to leverage (measured as LE), the four sectors with the highest average relative increase are retail (86.1%), hotels (99%), transportation (94.7%), and software and services (60.6%). The four sectors with the lowest average relative increase are banking and insurance (2.6%), household and personal products (8.1%), real estate (9.2%), and diversified financials (12.7%). The household and personal products sector includes companies such as L’Oreal, Unilever and Henkel. Real estate includes companies that are not intensive in real estate from a lessee point of view (they are lessors or agents): Klepierre, Merlín Properties, Savills, Unibail-Rodamco, etc., for example.

Leverage measured as LA is less impacted since both assets and liabilities increase with IFRS 16 adoption. The maximum average increase can be seen in the retail sector (23.4%) and the minimum average increase can be seen in the banking and insurance sector (0.2%). The retail sector is that with highest lease expense / liability ratio and the banking sector has the lowest lease expense / liability ratio.

ROA impact is subject to a different analysis since there are three variables to consider, namely the increase in net results deducting interest expense; the increase in total assets;
and ROA level prior to IFRS 16 implementation (if the ROA level is relatively low, IFRS 16 implementation will, in principle, have a higher impact). Therefore, ROA impact is not as correlated with the lease expense / liability ratio, as it is also explained by other factors such as the previous ROA level. The results differ between sectors and none shows a statistical significance except for the telecommunications sector.

The three sectors with the highest ROA mean relative increase are hotels (15%), commercial (9%), and capital goods (8.2%). The commercial and capital good sectors combine two characteristics: they have a relatively high lease expense / liability ratio and a relatively low ROA level. The commercial sector is that with the fourth highest lease expense / liability ratio level. It includes companies that provide a range of different services: Securitas, Prosegur, Adecco, Capita, etc. The capital goods sector has an expense / liability ratio level which is above the total sample average. It includes companies that have a high total asset volume and, therefore, the increase in assets is relatively lower than the increase in return. Examples of companies in this sector are Schindler, Atlas Copco, Fenner, Saint Gobain, Siemens, etc.

The three sectors with the lowest ROA mean relative increase are software and services (-3.4%), media (-1.4%), and materials (-0.5%). These are sectors with a relatively high ROA level prior to IFRS 16 implementation. For example, in the software and services sector, the following facts should be considered:

- The ROA level is high (mean 21.4%).
- The general level of asset is low. Therefore, the increase in asset is relatively high.

In order to analyse impact on interest coverage ratio by sector, the following variables should be considered:
- EBITDA increase. Lease expense was previously included in EBITDA. Under IFRS 16 implementation EBITDA will not be deducted since lease expense will be converted to amortisation and interest expense.

- Interest expense increase. The higher the interest expense increase, the higher the negative impact on the interest coverage ratio.

- Interest coverage ratio level prior to IFRS 16 implementation. The lower the ratio level, the higher the relative impact.

In general, the ratio level decreases since the EBITDA increase is lower (in relative terms) than the interest expense increase (although it is higher is absolute terms).

The three sectors with the highest interest coverage ratio mean relative decrease are software and services (-27.1%), retail (-25.7%), and transportation (25.7%); these are the sectors with a relatively high lease expense / liability ratio.

6. Conclusions

In January 2016, the IASB issued the new lease standard (IFRS 16) that will be mandatory and applicable for annual reporting periods beginning on or after 1 January 2019. In February 2016, the FASB also issued new standard for lease accounting (ASU No. 2016-02, Leases (Topic 842)) with a similar adoption date.

IFRS 16 and its US GAAP equivalent will basically entail capitalising current operating leases for the lessee (with some exceptions). The lessee balance sheet and profit and loss account will undergo an important change depending on the volume of current operating leases.

Previous studies apply capitalisation methods in order to estimate the impact of lease capitalisation on companies’ balance sheet and their most important ratios and metrics. We follow this line of research and we also apply a capitalisation method, but with some important changes in the methodology (in order to adapt this methodology to real IFRS
16 requirements), and for a sample of 646 European quoted companies. Our study was executed once the standard had been issued, therefore we know the final model that will be implemented.

In relation to our methodology, we rework how the lease term is estimated (more in line with the final approved standard, as we believe that the methodology of Imhoff et al. (1991, 1997) does not fully comply with IFRS 16 requirements), and we also change how the discount rate is obtained (taking into account both the credit risk of the entity and the recovery rate of the collateral, which have not been previously considered).

We analyse balance sheet / leverage, profitability, and interest coverage ratios, i.e. we calculate ratio levels before and after IFRS 16 operating lease capitalisation and we analyse the differences. We find, rejecting our hypothesis, that:

- The adoption of IFRS 16 will have a significant impact on balance sheet, leverage and solvency ratios of European quoted companies. Nevertheless, the analysis of profitability does not show consistent results across sectors.

- The magnitude of the impact depends on the sector in which the company operates.

In general terms, total assets and total liabilities will increase significantly; leverage will increase significantly; and interest coverage will decrease. Nevertheless, the results differ greatly according to the sector. The most affected sectors are those in which the ratio operating lease expense divided by total liabilities (lease intensity) is higher, basically the retail, transportation, hotels, and software and services sectors. In the case of the first three this is due to the “off-balance sheet” finance level they maintain, and in the case of software and services this is due to the small size on the balance sheet. Moreover, our results differ from those of previous studies (our calculated impact being higher) due to the new methodology that we apply.
Profitability, as measured by ROA, does not show a significant mean increase. However, ROA decreases in several sectors (household, materials, pharmaceuticals and media). Several authors obtain a mean decrease as they do not consider that the numerator of this ratio should be adjusted by the interest expense.

Apart from significant differences among sectors, there are also significant differences among companies in the same sector as can be seen when the standard deviation is analysed. Entities with a higher relative “off-balance sheet” finance level will see their relative risk position in relation to their peers worsen.

Our study and methodological proposal has several benefits for analysts. The method proposed can be adopted by analysts for predicting IFRS 16 impact on financial statements of specific companies or sectors. Analysts will have to start predicting IFRS 16 effects on ratios in order to be prepared for IFRS 16 adoption. For example, credit rating agencies currently estimate operating lease liability in order to calculate their ratios. From now on they will have to consider IFRS 16 requirements to predict new leverage level.

In general, many financial measures that take accounting information as their basis will need to be reviewed. One such example is debt covenants. An entity may break a covenant simply because a new accounting standard is adopted (and not because there is an increase in credit risk level). Another example is employee benefit plans. If, for example, the plan is linked to EBITDA, once IFRS 16 is implemented the EBITDA level will change (it will increase), and hence the target EBITDA should be adapted.

It should be noted that these estimated changes in ratios and metrics due to IFRS 16 lease capitalisation will appear on real financial statements once the new standard is implemented. In other words, once the new standard is implemented, users of financial
statements will not have to make any adjustments in this sense (without having the risk of committing errors during the estimation of the lease capitalisation impact).

Finally, our study contributes to other research areas that analyse the variables that determine lease intensity of different companies or sectors. Lease determinants has been a subject of interest (K. J. Cornaggia et al., 2012; Devos & Rahman, 2014; Lasfer & Levis, 1998; Smith & Wakeman, 1985) since leverage is one of the explanatory variables of the lease policy of companies. Considering the future IFRS 16 impacts on leverage and other ratios, lease policy of many companies may start changing (previewing IFRS 16 implementation). Operating leases will not have previous accounting advantages anymore. A new research line could be conducted in relation to how IFRS 16 is already impacting companies’ lease policy. In principle, it is expected that companies with high leverage previous to IFRS 16 will reduce their lease intensity in order to not have a leverage problem once IFRS 16 is implemented.

**Acknowledgements**

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**Disclosure statement**

No potential conflict of interest was reported by the authors.

**Notes**

1 There are also several literature reviews about lease accounting topic (Barone et al., 2014; Beattie, Goodacre, & Thomson, 2000; Goodacre, 2003; Morais, 2011; Spencer & Webb, 2015).

2 The FASB also issued a first draft in 2010 and a revised draft in 2013, as this has been a joint project. Before issuing the Exposure Drafts they issued a Discussion Paper in 2009 ("Leases. Preliminary Views").

3 There were 760 letters responding to 2010 ED and 640 letters responding to 2013 ED, issued by: companies, other standards issuers, governments, professional bodies, academics, individuals, etc.

4 Euro is the functional currency of the majority of the companies in the sample but not the functional currency of all the companies. Nevertheless, in current economic context, all European free risk rates are similar and very low.
References


Table 1. Recent literature on lease accounting

<table>
<thead>
<tr>
<th>Authors</th>
<th>Sample</th>
<th>Method</th>
<th>Analysed ratios and result</th>
<th>Sector and other information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mullford &amp; Gram (2007)</td>
<td>19 retail companies in the US. Years 2005 and 2006.</td>
<td>Constructive method</td>
<td>Total assets: increase of 14.6%. Total liabilities: increase by 26.4%. Liability / Equity: increase by 265.1% (absolute terms). EBITDA: increase of 22.5%. Income from continuing operations: decrease by 5.3%. EPS: decrease by 5.3%. ROA: decrease by 1.7% in absolute terms (15.5% in relative terms). ROE: decrease by 0.6% (4.8% in relative terms).</td>
<td>According to the authors, it is clear that excluding operating leases from the balance sheet causes a material distortion of the financial position of the company.</td>
</tr>
<tr>
<td>Durocher (2008)</td>
<td>100 largest Canadian quoted companies for years 2002 and 2003 (belonging to all sectors).</td>
<td>Constructive method</td>
<td>LA: increase by 2.66% (4.02% in relative terms). Current ratio: decrease by 0.065 (4.74% in relative terms). ROA: increase by 0.03% (0.72% in relative terms). ROE: decrease by 0.73% (6.64% in relative terms). EPS: decreases by 0.455 (0.03% in relative terms).</td>
<td>Sectors with higher differences in the LA ratio would be the merchandizing and lodging sectors (an increase of 6.6% in absolute terms and 11.57% in relative terms), and sectors with higher ROA difference would be industrial products (with a decrease of 2.3% in absolute terms).</td>
</tr>
<tr>
<td>Fülhier et al. (2008)</td>
<td>Sample of 90 companies belonging to the three major German indices: DAX 30, MDAX and SDAX. Years 2003 and 2004.</td>
<td>Constructive method and factor method</td>
<td>Total liabilities: increase by 17.3%. Non-current assets: increase by 8.5%. LE: increase by 16.1% (8.0% in relative terms). EBIT: increases by 2.9%. Ratios such as EPS, ROA, and ROE do change at a minimum percentage.</td>
<td>Factor method can supply comparable results in a low-interest environment and when a firm is capitalizing comparatively short-term lease contracts.</td>
</tr>
<tr>
<td>Duke et al. (2009)</td>
<td>366 US companies on the S&amp;P index (all companies except for utility and banking industries). Year 2003.</td>
<td>Constructive method</td>
<td>Total liabilities: USD 582.04 million increase on average (11.13%, 34.24% for the 91 firms in the top quartile). Retain earnings: decrease of USD 131.79 million decrease on average. Net income: decrease of USD 21.99 million on average for 215 firms. LE: increase by 0.40% in absolute terms (13% in relative terms). ROA: decrease by 0.47% in absolute terms for the “negative income group” (8.26% in relative terms) and increase by 0.11% in absolute terms for the “positive income group” (3.49% in relative terms). Current ratio would decrease by 0.14 in absolute terms for the “negative income group” (6.89%) and decrease by 0.11 for the “positive income group” (5.69%).</td>
<td>According to the authors, if the model does not change, companies would continue to hide liabilities and assets in order to report higher income numbers and to pay less income taxes, as well as to report improved financial ratios.</td>
</tr>
<tr>
<td>Singh (2012)</td>
<td>234 restaurants and retail firms from years 2006 to 2008.</td>
<td>Constructive method</td>
<td>LE: increase from 0.30 to 1.38 (354% in relative terms). Leverage: increase from 0.187 to 0.477 (155% in relative terms). ROA: decrease from 0.049% to 0.034% (32% in relative terms). EBITDA: increase from 0.08 to 0.129 (61.3% in relative terms).</td>
<td>The magnitude and direction of the impact will be significant for both industry sectors. However, significant absolute and relative differences were also found across industries and within the sectors.</td>
</tr>
<tr>
<td>Fitó et al. (2013)</td>
<td>52 Spanish non-financial quoted companies for the period 2006-2010</td>
<td>Constructive method</td>
<td>Leverage ratio (total liabilities / total equity + total liabilities): increase by 0.023 (34.48% in relative terms). ROA: decrease by 0.001 (3.7% in relative terms). ROE: decreases by 0.047 (17.67% in relative terms).</td>
<td>Results depend on the sector. The most affected sector is “retail services” (in which they include hotels and airlines which are the most affected subsectors). Retail goods, energy and technology also have a relevant effect. Furthermore size does not seem to be a significant variable for the analysis.</td>
</tr>
<tr>
<td>Pardo et al. (2015)</td>
<td>Ibex 35 companies for the period 2010-2013</td>
<td>Constructive method</td>
<td>Leverage (total liabilities / total assets): increase by 0.65% (in relative terms). ROA: decrease by 2.15% (in relative terms).</td>
<td>Larger firms and those that belong to the retail industry have more operating leases than others.</td>
</tr>
<tr>
<td>Wong &amp; Joshi (2015)</td>
<td>107 Australian quoted companies from several sectors. Year 2010.</td>
<td>Constructive method</td>
<td>Total assets: increase by 3.47%. Total liabilities: increase by 4.34%. LE: increase by 0.25 (31.49% in relative terms). LA: increases by 0.46 (10.11%). ROA: decrease by 0.87% (15.35%). ROE: decrease by 0.33% (1.23%).</td>
<td>The right-to-use leased asset value is strongly associated with current and future return on assets.</td>
</tr>
</tbody>
</table>
Table 2. Sample Description

<table>
<thead>
<tr>
<th>Total sample</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Constituents of STOXX Total Market (Datastream’s mnemonic LDJTMSTE)</td>
<td>1051</td>
</tr>
<tr>
<td>Companies without annual operating lease expense reported</td>
<td>335</td>
</tr>
<tr>
<td>Outliers</td>
<td>(54)</td>
</tr>
<tr>
<td>Companies with very diversified activities</td>
<td>(16)</td>
</tr>
<tr>
<td><strong>Total sample (N)</strong></td>
<td><strong>646</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Distribution of the sample by GICS code</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>1010-5510 Energy &amp; Utilities</td>
<td>46</td>
</tr>
<tr>
<td>1510 Materials</td>
<td>58</td>
</tr>
<tr>
<td>2010 Capital Goods</td>
<td>101</td>
</tr>
<tr>
<td>2020 Commercial &amp; Professional Services</td>
<td>28</td>
</tr>
<tr>
<td>2030 Transportation</td>
<td>29</td>
</tr>
<tr>
<td>2510 Automobiles &amp; Components</td>
<td>10</td>
</tr>
<tr>
<td>2520-2530- Consumer Durables &amp; Apparel, Consumer Services</td>
<td></td>
</tr>
<tr>
<td>2550-3010 Retailing and Food &amp; Staples Retailing</td>
<td>41</td>
</tr>
<tr>
<td>2540 Media</td>
<td>23</td>
</tr>
<tr>
<td>3020 Food, Beverage &amp; Tobacco</td>
<td>26</td>
</tr>
<tr>
<td>3030 Household &amp; Personal Products</td>
<td>5</td>
</tr>
<tr>
<td>3510 Health Care Equipment &amp; Services</td>
<td>14</td>
</tr>
<tr>
<td>3520 Pharmaceuticals, Biotechnology &amp; Life Sciences</td>
<td>27</td>
</tr>
<tr>
<td>4010-4030 Banks and Insurance</td>
<td>75</td>
</tr>
<tr>
<td>4020 Diversified Financials</td>
<td>36</td>
</tr>
<tr>
<td>4040 Real Estate</td>
<td>36</td>
</tr>
<tr>
<td>4510 Software &amp; Services</td>
<td>22</td>
</tr>
<tr>
<td>4520-4530 Technology Hardware &amp; Equipment</td>
<td></td>
</tr>
<tr>
<td>5010 Telecommunication Services</td>
<td>22</td>
</tr>
<tr>
<td>253010 Hotels</td>
<td>27</td>
</tr>
<tr>
<td><strong>Total (N)</strong></td>
<td><strong>646</strong></td>
</tr>
<tr>
<td>Sector</td>
<td>Average lease life used (years)</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>---------------------------------</td>
</tr>
<tr>
<td>Transport (Airlines)</td>
<td>16</td>
</tr>
<tr>
<td>Retail (clothing, food and other)</td>
<td>20</td>
</tr>
<tr>
<td>Oil &amp; Gas</td>
<td>14</td>
</tr>
<tr>
<td>Energy (Power)</td>
<td>16</td>
</tr>
<tr>
<td>Hotels and similar</td>
<td>17</td>
</tr>
<tr>
<td>Telecommunications</td>
<td>16</td>
</tr>
<tr>
<td>Industrial</td>
<td>14</td>
</tr>
</tbody>
</table>
Table 4

Recovery rate for energy sector based on Iberdrola CDS

<table>
<thead>
<tr>
<th>Asset Class</th>
<th>Recovery Rate</th>
<th>CDS Spread 5y</th>
<th>Shift from 5y</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard (quoted)</td>
<td>40.00%</td>
<td>0.921%</td>
<td>N/A</td>
</tr>
<tr>
<td>Vehicles</td>
<td>60.47%</td>
<td>0.619%</td>
<td>-39.72%</td>
</tr>
<tr>
<td>Machinery</td>
<td>50.91%</td>
<td>0.760%</td>
<td>-19.17%</td>
</tr>
<tr>
<td>ICT</td>
<td>11.79%</td>
<td>1.337%</td>
<td>37.30%</td>
</tr>
<tr>
<td>Equipment</td>
<td>33.96%</td>
<td>1.010%</td>
<td>9.26%</td>
</tr>
<tr>
<td>Other</td>
<td>53.98%</td>
<td>0.714%</td>
<td>-25.36%</td>
</tr>
<tr>
<td>Real Estate</td>
<td>80.00%</td>
<td>0.331%</td>
<td>-102.21%</td>
</tr>
</tbody>
</table>

Recovery rate for financial sector based on Santander CDS

<table>
<thead>
<tr>
<th>Asset Class</th>
<th>Recovery Rate</th>
<th>CDS Spread 5y</th>
<th>Shift from 5y</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard (quoted)</td>
<td>40.00%</td>
<td>1.387%</td>
<td>N/A</td>
</tr>
<tr>
<td>Vehicles</td>
<td>60.47%</td>
<td>0.949%</td>
<td>-37.96%</td>
</tr>
<tr>
<td>Machinery</td>
<td>50.91%</td>
<td>1.153%</td>
<td>-18.43%</td>
</tr>
<tr>
<td>ICT</td>
<td>11.79%</td>
<td>1.991%</td>
<td>36.19%</td>
</tr>
<tr>
<td>Equipment</td>
<td>33.96%</td>
<td>1.516%</td>
<td>8.91%</td>
</tr>
<tr>
<td>Other</td>
<td>53.98%</td>
<td>1.087%</td>
<td>-24.32%</td>
</tr>
<tr>
<td>Real Estate</td>
<td>80.00%</td>
<td>0.504%</td>
<td>-101.27%</td>
</tr>
</tbody>
</table>

Recovery rate for generic sector based on Klepierre CDS

<table>
<thead>
<tr>
<th>Asset Class</th>
<th>Recovery Rate</th>
<th>CDS Spread 5y</th>
<th>Shift from 5y</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard</td>
<td>40.00%</td>
<td>0.666%</td>
<td>N/A</td>
</tr>
<tr>
<td>Vehicles</td>
<td>60.47%</td>
<td>0.442%</td>
<td>-40.89%</td>
</tr>
<tr>
<td>Machinery</td>
<td>50.91%</td>
<td>0.547%</td>
<td>-19.68%</td>
</tr>
<tr>
<td>ICT</td>
<td>11.79%</td>
<td>0.974%</td>
<td>38.04%</td>
</tr>
<tr>
<td>Equipment</td>
<td>33.96%</td>
<td>0.736%</td>
<td>10.01%</td>
</tr>
<tr>
<td>Other</td>
<td>53.98%</td>
<td>0.513%</td>
<td>-26.03%</td>
</tr>
<tr>
<td>Real Estate</td>
<td>80.00%</td>
<td>0.229%</td>
<td>-106.63%</td>
</tr>
</tbody>
</table>
**Table 5.** Ratios used

<table>
<thead>
<tr>
<th>Balance sheet ratios</th>
<th>Expression</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase in assets</td>
<td>$var. Ass_i = \frac{Assets'_i}{Assets_i} - 1$</td>
</tr>
<tr>
<td>Increase in liabilities</td>
<td>$var. Liab_i = \frac{Liabilities'_i}{Liabilities_i} - 1$</td>
</tr>
<tr>
<td>Lease expense on assets (lease intensity)</td>
<td>$Leas. exp/Liab_i = \frac{Operating Lease Expense_i}{Assets_i}$</td>
</tr>
</tbody>
</table>

**Leverage ratios**

Leverage on assets before IFRS 16 adoption

$LAI = \frac{Liabilities_i}{Assets_i}$

Leverage on assets after IFRS 16 adoption

$LAI' = \frac{Liabilities'_i}{Assets'_i}$

Comparability index of leverage on assets

$Cl.LAI = \frac{LA'_i - LA_i}{LA_i}$

**Profitability ratios**

ROA before IFRS 16 adoption

$ROAI = \frac{EBIT_i}{Assets_i}$

ROA after IFRS 16 adoption

$ROA_i = \frac{EBIT'_i}{Assets'_i}$

Comparability index of ROA

$Cl.ROA_i = \frac{LA'_i - LA_i}{LA_i}$

**Coverage ratios**

Financial expenses coverage before IFRS 16 adoption

$COV_i = \frac{EBITDA_i}{Int. Exp_i}$

Financial expenses coverage after IFRS 16 adoption

$COV'_i = \frac{EBITDA'_i}{Int. Exp'_i}$

Comparability index of coverage of financial expenses coverage after IFRS 16 adoption

$Cl.COV_i = \frac{COV'_i - COV_i}{COV_i}$
<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
<th>(7)</th>
<th>(8)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>mean</td>
<td>Wilcoxon</td>
<td>t-test</td>
<td>p50</td>
<td>sd</td>
<td>min</td>
<td>max</td>
</tr>
<tr>
<td>var.Ass</td>
<td>646</td>
<td>0.0996</td>
<td>23.439***</td>
<td>0.0151</td>
<td>0.135</td>
<td>6.49e-05</td>
<td>0.839</td>
<td></td>
</tr>
<tr>
<td>var.Liab</td>
<td>646</td>
<td>0.214</td>
<td>20.525***</td>
<td>0.112</td>
<td>0.287</td>
<td>8.97e-05</td>
<td>1.681</td>
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</tr>
<tr>
<td>Leas.exp/Liab</td>
<td>646</td>
<td>0.0186</td>
<td>19.624***</td>
<td>0.0127</td>
<td>0.0192</td>
<td>5.24e-05</td>
<td>0.0982</td>
<td></td>
</tr>
<tr>
<td><strong>LE</strong></td>
<td>646</td>
<td>4.027</td>
<td>21.599***</td>
<td>1.615</td>
<td>9.354</td>
<td>0.0175</td>
<td>143.9</td>
<td></td>
</tr>
<tr>
<td><strong>LE’</strong></td>
<td>646</td>
<td>4.725</td>
<td>2.175</td>
<td>9.708</td>
<td>0.0251</td>
<td>145.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>CLLE</strong></td>
<td>646</td>
<td>0.321</td>
<td>21.537***</td>
<td>0.149</td>
<td>0.494</td>
<td>0.000185</td>
<td>3.808</td>
<td></td>
</tr>
<tr>
<td><strong>LA</strong></td>
<td>646</td>
<td>0.618</td>
<td>23.286***</td>
<td>0.618</td>
<td>0.196</td>
<td>0.0172</td>
<td>0.993</td>
<td></td>
</tr>
<tr>
<td><strong>LA’</strong></td>
<td>646</td>
<td>0.665</td>
<td>0.685</td>
<td>0.190</td>
<td>0.0245</td>
<td>0.993</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>CLLA</strong></td>
<td>646</td>
<td>0.0928</td>
<td>12.567***</td>
<td>0.0485</td>
<td>0.117</td>
<td>2.47e-05</td>
<td>0.601</td>
<td></td>
</tr>
<tr>
<td><strong>ROA</strong></td>
<td>646</td>
<td>0.0772</td>
<td>-4.871***</td>
<td>0.0618</td>
<td>0.165</td>
<td>-1.665</td>
<td>2.726</td>
<td></td>
</tr>
<tr>
<td><strong>ROA’</strong></td>
<td>646</td>
<td>0.0764</td>
<td>0.0645</td>
<td>0.143</td>
<td>-1.531</td>
<td>2.223</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>CLROA</strong></td>
<td>646</td>
<td>0.0307</td>
<td>1.649*</td>
<td>0.00659</td>
<td>0.256</td>
<td>-1.843</td>
<td>1.777</td>
<td></td>
</tr>
<tr>
<td><strong>COB</strong></td>
<td>646</td>
<td>202.707</td>
<td>15.344***</td>
<td>12.99</td>
<td>4.996e+06</td>
<td>-9.295</td>
<td>1.232e+08</td>
<td></td>
</tr>
<tr>
<td><strong>COB’</strong></td>
<td>646</td>
<td>28.47</td>
<td>11.71</td>
<td>79.61</td>
<td>-6.928</td>
<td>1.072</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>CLCOB</strong></td>
<td>646</td>
<td>-0.122</td>
<td>4.071***</td>
<td>-0.0364</td>
<td>0.236</td>
<td>-1.000</td>
<td>0.529</td>
<td></td>
</tr>
</tbody>
</table>

† var.Ass: increase in assets after IFRS 16 adoption divided by total assets before IFRS 16 adoption; var.Liab: increase in liabilities after IFRS 16 adoption divided by total liabilities before IFRS 16 adoption; Leas.exp/Liab: Lease expense on liabilities; LE: Leverage on equity before IFRS 16 adoption; LE’: Leverage on equity after IFRS 16 adoption; CLLE: Comparability index of leverage on equity, i.e. the difference between LE’ and LE, divided by LE; LA: Leverage on assets before IFRS 16 adoption; LA’: Leverage on assets after IFRS 16 adoption; CLLA: Comparability index of leverage on assets, i.e. the difference between LA’ and LA, divided by LA; ROA: Earnings before interest and taxes divided by total assets; ROA’: Earnings before interest and taxes divided by total assets (all after IFRS 16 adoption); CLROA: Comparability index of ROA, i.e. the difference between ROA’ and ROA, divided by ROA; COV: Earnings Before Interest, Taxes, Depreciation, and Amortization divided by interest expense (all before IFRS 16 adoption); COV’: Earnings Before Interest, Taxes, Depreciation, and Amortization divided by interest expense (after IFRS 16 adoption); CLCOV: Comparability index of coverage of financial expenses coverage after IFRS 16 adoption, i.e. the difference between COV’ and COV, divided by COV. *** Significant at the 0.01 level (two-tailed). ** Significant at the 0.05 level (two-tailed). * Significant at the 0.1 level (two-tailed).