
THE VALUE RELEVANCE OF INDIVIDUAL AND CONSOLIDATED
STATEMENTS: A COMPARISON FOR THE PORTUGUESE LISTED
FIRMS

Luís Eduardo Fernandes Honrado

Internship report
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Supervised by
Prof. Dra. Maria Margarida Queiroz de Mello (Faculdade de Economia do Porto)

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Biographical Notes

Luís Eduardo Fernandes Honrado is a Master of Economics student at the Faculdade de Economia do Porto (FEP) of the University of Porto since 2016. Born at Macedo de Cavaleiros, Bragança on April 24th, 1995, he studied for the bachelor's degree in Economics at Escola de Economia e Gestão of University of Minho (2013-16).

Between October 2017 and April 2018, Luís was selected to enter a curricular internship in the Central Balance-sheet Division of the Statistics Department at the Banco de Portugal. This internship report is based on the tasks performed in the curricular internship, which were mainly the analysis of accounting information reported by firms.

At present, Luís is performing a summer internship in the Central Balance-Sheet Division of the Statistics Department at the Banco de Portugal. This internship provides the opportunity to continue to develop the academic and professional skills Luís acquired during his first internship at this prestigious Portuguese institution.

Besides the university education, Luís has an interest in additional education, mainly through online courses in the areas of economics and technology. For leisure, travelling and reading are his main interests.

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Abstract

This internship report compares the individual and consolidated accounting statements of non-financial Portuguese listed firms from an economic and accounting perspective. The report is based on an internship at the Central Balance-sheet Division of the Banco de Portugal and it contributes to the economic and financial analysis of individual and consolidated statements. The focus of the analysis is the value relevance of accounting information, that is, to what extent the accounting information is related to firms' market value. We develop a modified price regression model to measure the extent to which market values are explained by the accounting information. This model expresses the market value of firms as a function of the balance-sheet and income statement accounting items. The sample consists of 46 non-financial Portuguese listed firms observed during the period 2007-2016, extracted from the Banco de Portugal databases. The results show that different accounting items are relevant to explain the market value of firms with both individual and consolidated statements, because these different items are related to the specific features of each type of accounting statement. Additionally, we analysed how the firms' size and their sector of activity influence the value relevance of accounting information, and found that size and the energy sector have a positive impact on the market value of firms with both individual and consolidated statements. The key conclusion of this report is that accounting information is a significant determinant of the firms' market values. In addition, our analysis suggests that the specifications using consolidated information produce better forecasts for firms' market values than those using non-consolidated data.

JEL codes: G10, M41, M48

Keywords: Market value of firms; value relevance; financial information; consolidated accounting statements; individual accounting statements;

Resumo

Este relatório curricular compara, numa perspetiva económica e contabilística, a informação financeira individual e consolidada das sociedades não financeiras cotadas em Portugal. Uma das tarefas desenvolvidas pelo Núcleo de Análise de Balanços do Banco de Portugal, entidade onde foi realizado o estágio curricular, é contribuir para a análise económica e financeira das demonstrações consolidadas quando comparadas com as individuais. O foco da análise corresponde à relevância da informação financeira, isto é, em que medida a informação contabilística reportada pelas empresas está relacionada com o seu valor de mercado. Desenvolvemos uma versão modificada do modelo conhecido na literatura como *Price Regression Model*, que especifica a relação de dependência entre o valor de mercado de uma empresa/grupo e a informação contabilística disponível sobre a sua atividade económica e financeira. Este modelo expressa o valor de mercado das empresas como função das rubricas do balanço e da demonstração de resultados. A amostra consiste em 46 empresas portuguesas não financeiras cotadas em bolsa observadas no período 2007-2016. Os resultados demonstram que as rubricas relevantes para explicar os valores de mercado são diferentes nos reportes individuais e consolidados, estando relacionadas com as características particulares de cada tipo de reporte. Analisamos também a influência da dimensão e do setor de atividade das empresas e concluímos que empresas de grande dimensão e/ou pertencentes ao setor da energia apresentam valores de mercado superiores, em média, aos de empresas de menor dimensão e/ou pertencentes a outros setores de atividade. A conclusão principal deste relatório é que a informação contabilística é uma determinante significativa do valor de mercado das empresas. Adicionalmente, verifica-se que o modelo que utiliza a informação contabilística consolidada prevê os valores de mercado das empresas de forma mais precisa, sugerindo que esta informação não só explica melhor como prevê com maior precisão os valores de mercado.

Códigos JEL: G10, M41, M48

Palavras-chave: Valor de mercado das empresas; relevância da informação contabilística; informação financeira; demonstrações contabilísticas consolidadas; demonstrações contabilísticas individuais;

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1. Introduction

This report is the result of a 6-month curricular internship taken by the author at the Central Balance-sheet Division of the Statistics Department of Banco de Portugal (BdP), in direct contact with the Balance-sheet Analysis Unit. Given that the Balance-sheet Analysis Unit works directly with the firms' individual and consolidated accounting statements, the aim of this report is to make a valid contribution to the literature by producing a comparison of the relevance of individual and consolidated accounting statements for the firms' market value of the Portuguese non-financial listed firms.

The literature on this theme refers to the ability of accounting information to explain and predict firms' market value as its "value relevance" (e.g. Francis and Schipper, 1999; Ali and Hwang, 2000; Barth *et al.*, 2001; Hung and Subramanyam, 2004; Hellström, 2006). The value relevance is also referred to, the literature, as an ex-post explanation of firms' stock prices variations due to accounting information (Beisland, 2009).

Accounting information provides investors with valuable knowledge that enables them to frame their investment decisions according to the firms' predicted values. The most important characteristics of reliable accounting information are its timeliness (availability on time of being useful), its comparability (being easily comparable with similar information) and its understandability (being clear and concise)¹. Notwithstanding, the most important feature of accounting information is to accurately reflect the actual reality and have a significant impact on investors' decisions (Paea, 2013). Therefore, the quality of the accounting information disclosed by firms can be measured by its value relevance, that is, the information available about the economic and financial performance of firms can explain their market values.

Portuguese listed firms are required to disclose their accounting information regarding their activity as the parent-firm² in yearly individual accounting statements. Additionally, parent-firms are required to disclose consolidated accounting statements which provide accounting information regarding their activity as the group of firms.

In individual accounting statements, the subsidiaries' accounting information is accounted in aggregate items containing information regarding the subsidiaries' activities,

¹ For more detailed information regarding the qualities of accounting information see IFRS Conceptual Framework (IASB, 2010).

² Firms that influence the financial and business policy of other companies.

whereas in consolidated accounting statements the subsidiaries' information is disaggregated in different items like if it is only a firm (Rodrigues, 2015). Contrariwise, according to the Deutsche Bundesbank (2014, p.54): "*Consolidated financial statements are derived by consolidating the separate financial statements prepared by the enterprises belonging to the group. This means that the accounting data disregard the intra-group transactions and financial links (...)*".

Given that individual and consolidated accounting statements have different characteristics, their relationship with the market value of firms is also dissimilar. Our research intends to explain the difference between the value relevance of accounting information of individual and consolidated statements for the non-financial listed firms in Portugal. Moreover, this research intends to clarify which kind of statements is more useful for investors in their capital allocation decisions.

In this way, the conclusions of our research may give a contribution to the understanding of which type of accounting statements better explains the market value of firms and which are the accounting items, in both type of statements, that have a more significant impact on the market value of firms.

To the best of our knowledge, the studies focusing on Portuguese firms that compare consolidated and individual statements in those two aspects are rare. Therefore, it is believed that, by focusing on Portugal, this study contributes to extend the scarce existing literature on this particular aspect. We contribute further to the literature by comparing the results obtained in this study to those obtained in other studies focusing on data from other countries.

To attain this objective, we develop a modified price regression model (PRM), based on the models proposed by Ohlson (1995) and Feltham and Ohlson (1995), to measure the extent to which market value is explained by accounting information. This modified PRM represents the firms' market value as a linear function of several balance-sheet and income statement items. The market values used in this research are measured at the end of the financial year.

To establish the relationship between accounting information and the market value we use information about 46 non-financial Portuguese listed firms observed during the period 2007-2016. The necessary information on individual accounting statements,

consolidated accounting statements and on the market values of firms, was obtained from the BdP databases.

The estimation results show that different accounting items are relevant to explain the market value of firms when using both individual and consolidated statements. In the models using individual statements, the items of '*operating net income*' and the '*goodwill*' are the accounting items with higher positive impact on the market value. In models using consolidated statements, the most significant items are the '*earnings before taxes*' and the '*development costs*'. Additionally, the item of '*current borrowings and leases*' have a negative impact on the market value in both type of statements, possibly because this item may enable investors to determine if a company can pay its short-term obligations.

This study also provides an analysis of the way in which the sector of activity and the size of firms influence the value relevance of accounting information. We conclude that larger firms and the energy sector have higher market values than smaller firms and firms operating in other sectors. The results for the energy sector may be explained by the relative "overweight" that the energy sector has in the Portuguese economy.

The key conclusion of this report is that accounting information is significantly related to firms' market value and that investors use this information to improve their investment decisions. Additionally, our analysis suggest that consolidated accounting information better predicts the market value of firms when compared with individual information, as the model using consolidated statements obtains forecasts closer to the actual market values. This may imply that accounting information disregarding the financial and operational links between the firms of a group, better explains the market value of firms and investors rely more on this type of information than in any other to base their investment decisions. This may be so because consolidated statements enable investors to better interpret the financial and business situation of the group, including the group's financial liquidity (Rodrigues, 2008).

This report proceeds as follows. Section 2 presents a literature review, focusing on how the accounting information is related to market efficiency and economic growth. Section 3 provides a description of the models and methods applied in the research on these matters. Section 4 analyses the descriptive statistics of all relevant variables. Section 5 presents and discusses the estimation results of the modified PRM using individual and consolidated statements. Section 6 offers some concluding remarks.

2. Literature Review

The relationship between accounting information and the market value of firms is the focus of the empirical researches based on the concept of value relevance. Given that accounting information has an impact on investors' decisions (measured by how it explains the market value of firms), accounting information has an impact on the allocation of capital and, therefore, on economic growth. This relationship is described on section 2.1. Section 2.2 presents the literature that focus on the conceptual differences between the individual and consolidated statements. Section 2.3 describes the empirical researches on the value relevance of accounting information. Lastly, section 2.4 describes the studies that focus on the impact of the adoption of the IFRS to the value relevance of accounting information.

2.1. Accounting information, market efficiency and economic growth

Providing society with economic welfare is an universal objective that requires strait cooperation between agents and decision-makers of the different sectors of the economy. According to Goldsmith (1969), periods of above-average financial development³ are usually linked to stronger economic growth. This assertion has the empirical support of many studies such as Levine (1991), which shows that stock markets that allow individuals to hold more diversified portfolios, may increase resources available to firms that, in turn, encourages economic growth. King and Levine (1993) state that financial markets have a positive impact on economic efficiency and economic growth in the present and in the future. Similarly, Rajan and Zingales (1998) approach this relationship using a sample of 41 countries for a period of 10 years (1980-1990). The main findings suggest that economic growth is influenced by financial developments, mainly due to the decreasing of the external financing costs.

The investments that firms need to develop new products and increase the production and distribution of goods and services are mainly raised through debt or equity. Debt financing happens when the firms sell debt instruments to institutional investors or individuals, promising to repay the principal and the interest associated (borrowings). Equity financing is the procedure of raising capital by selling shares of a firm. Investors finance firms through equity capital in the expectation of dividends or a healthy stock valuation.

³ Financial development is an expression associated with the expansion of markets, institutions and instruments that affect investment and transaction decisions, usually linked with the upper bound of the business cycles.

Over recent decades we have been observing an extraordinary growth in size, value and technology usage of financial markets, predominantly in developed countries but also in emerging ones. Financial markets are spread around the world, and while some may be small, others trade trillions of dollars every day (e.g. New York Stock Exchange, NASDAQ stock market, London Stock Exchange Group or Shanghai Stock Exchange). To trade financial assets, individuals and institutions use capital markets. The assurance that these markets work perfectly is of utmost importance for the economic system. Palea (2013) describes the importance of this matter in a very simple way: “*when the market works well, pricing of the securities is correct, the allocation of capital in the economy is efficient and everyone is better off*” (p. 248).

According to Wurgler (2000), the more developed the financial markets are, the better is the allocation of capital, as these markets invest more in growing industries than in declining ones. The research of Rajan and Zingales (1998) also provides evidence of the advantages of a developed financial market, being the cause of comparative advantage for countries with industry sectors more reliant on external finance. Therefore, there is a general empirical support to the idea that investment in quantity and quality is positively related with more efficient ways of financing the economy by the capital markets.

The development of capital markets is also associated with the increasing liberalization of international capital flows. Mussa and Goldstein (1993) state that, the technological boom, the reduced transactions costs, the improvements in the payments' system and the dissemination of financial literacy (among others) contributed to increase international investments. Also, the importance of international investments increased by the internet-based trading and financial deregulation (Healy and Palepu, 2001).

Cross-border financial flows have been recognized as a crucial benefit for most economies (Obstfeld, 1998; Kose *et al.*, 2006; Henry, 2000). By contrast, other authors (Rodrik, 1998; Stiglitz, 2002) argue that the increasing internationalization of capital contributes to global financial instability, especially in the aftermath of the 90's Asian crisis and the 2008 financial crisis. Nevertheless, the majority of the studies in the literature emphasize the positive role of the increasing globalization in capital markets. Some benefits are the diversification of investors' portfolio, the new capital funding opportunities for firms and the allowing of more high-yield but risky investments for both investors and firms (Obstfeld, 1998; Healy and Palepu, 2001).

In the case of private investment, Henry (2000) demonstrates that it grows more in developing countries that liberalize their stock markets than in countries that remain conservative towards liberalization. According to Mussa and Goldstein (1993), the influence of the capital internationalization can reach the monetary policy and the difficulties in managing fixed exchange regimes.

Notwithstanding, all the advantages of an increasing globalization of capital markets must be appropriately supervised by the competent institutions, ensuring the compliance with national and international rules, transparency and systemic risks prevention.

In the seminal article of Fama (1970), the author states that a market is efficient if securities' prices completely reflect the available information. In this way, investors would have a full understanding of their capital allocation possibilities and firms could make maximum return investments. Consequently, the efficiency of security markets has a significant impact on the business of entrepreneurs, managers, investors and other market participants (Kothari, 2001).

Nevertheless, due to the increasing complexity of the new financial instruments, the diversity of fiscal laws and fiscal policies, and even the growing 'creativity' of some accounting practices, the information available to the public is not always reliable or fully complete⁴.

Information about the financial performance and position of companies is one main objective of financial statements. As Palea (2013) states, this information has significant influence on the behaviour of investors and, consequently, on security prices. The difference between the intrinsic value of a security and its market price is smaller with the disclosure of correct information (Singhvi and Desai, 1971). The whole society has a keen interest in reliable, complete and transparent financial reports due to the economic consequences associated with the availability of full information,

According to Healy and Palepu (2001), the efficient allocation of savings to investment opportunities is a major challenge to most of the economies. The efficient allocation is diffculted by two main reasons.

⁴ As stated by Desai (2005), over 1990 and 2005 the difference between profits reported to capital markets and the profits reported to tax authorities has increased. The reason behind this difference may be related to 'creative' accounting practices or due to the flexibility of accounting standards.

First, for the asymmetric information between firms and shareholders that can increase the cost of issuing capital because it induces adverse selection problems and distort the confidence of investors in the market (Leuz and Verrecchia, 2000).

Healy and Palepu (2001) and Beyer *et al.* (2010) explain the difficulties in linking savings to investments' opportunities using a modified "Lemons Problem" (Akerlof, 1970). The authors assume that half of the business opportunities are 'bad' and the other half are 'good', and also that investors are rational and use all the available information. Without complete and reliable information, investors cannot differentiate between the two types of opportunities, and the entrepreneurs will try to purport the 'bad' investments as 'good'. Thus, worthy and unworthy investments may be included in the same average value by investors. For example, when trying to raise capital, managers might amplify the disclosure of favourable news, while concealing unfavourable ones (Hail, 2013). In this way, the market makes an incorrect evaluation of the investment opportunities and the cost of financing firms increases (Soderstrom and Sun, 2007). As economic theory predicts, this would lead to less economic efficiency and less growth.

The second reason restraining the efficient allocation of capital to investment opportunities arises as investors usually do not play an active role in the business management, leaving the command to managers (Healy and Palepu, 2001). Consequently, this gives rise to an 'agency problem'⁵, as managers and investors (shareholders) have different goals and information (Shleifer and Vishny, 1997; Kothari *et al.*, 2009). The research of Kothari *et al.* (2009) provides evidence that managers delay the disclose of bad news to investors, possibly due to career concerns. Moreover, market participants reaction to bad news seem to be more significant than their reaction to good news.

Corporate governance⁶ may have an important role on assuring that investors receive a fair return from their investments. According to (Shleifer and Vishny, 1997), while market competition is the most effective way of assuring that managers have to do their best for the

⁵ Agency problem is an expression to describe the conflict of interests between the principals and the agents. When the two parties have different interests and information, the principal cannot certify that the agent is acting on their behalf or on self-interest. The agency theory became public known after the article of Jensen and Meckling (1976). For more information regarding the agency problem theory see Lambert (2001) and Beyer *et al.* (2010).

⁶ Corporate governance can be defined as the system of rules and practices on which the corporations are directed, balancing the interests of creditors, shareholders, managers and board of directors (a more broadly definition may also include employees, suppliers, customers, government and environment).

success of the firm, corporate governance helps to offer guarantee of fair returns to investors and the use of socially accepted practices.

Corporate governance provides rules and practices that may reduce the information asymmetry between investors and managers (or entrepreneurs). The rules and practices may have the form of incentive contracts and deterring clauses between creditors and managers (Jensen and Meckling (1976, Shleifer and Vishny, 1997). Reputation may also be a reason why entrepreneurs do not mislead investors, given that an established good reputation facilitates funds raising (Shleifer and Vishny, 1997).

Providing financial statements according to national and international standards are fundamental to analyse the performance of firms and make fair judgments about their future earnings. Accounting information not only has influence on the evaluation of the potential returns of investments but also is vital to monitor managers' decisions about those investments (Beyer *et al.*, 2010). According to Desai (2005), "*the measurement of corporate profits is central to the process of capital allocation within an economy and to a variety of economic policy decisions*" (p. 172).

To help capital holders to identify the most rewarding investment opportunities it is crucial to supply individual and/or consolidated accounting statements that are both transparent and accurate. In fact, financial institutions, brokerage houses and individual investors use accounting information to evaluate the financial health of firms, to measure debt and equity securities and to appreciate the strengths and weaknesses of business projects (Hail, 2013). Allowing market agents to access the individual and/or consolidated accounts of listed firms facilitates a more insightful knowledge about the actual value of the firms and more accurate forecast of their future performance, conducting to more stable, profitable and fair financial markets.

2.2. Individual and consolidated accounting statements

Parker and Nobes (2008) suggest that the first published consolidated statements originate in the United States of America (USA), and only latter spread across continental Europe as a common practice. Walker (1976) states that consolidated statements have been popularized through the USA since the 1930s, becoming an important form of disclosing financial information to the market.

Accounting consolidation follows the idea that a group of firms form a single company. Hence, it assumes that equity holders are better informed with consolidated statements than with simple individual statements (Goncharov *et al.*, 2009). In Europe, parent companies are required to prepare financial statements, not only at the individual level, but also at the group (consolidated) level (Müller, 2011). In consolidated reports, Goncharov (2009) describes that income and expenses are documented in one single income statement, similar to what happens to assets and liabilities that are also presented on one single balance sheet. One of the main differences between individual and consolidated statements is the way in which they account for intra-group relationships.

Consolidated statements are a mirror of the entire economic entity, allowing to understand the financial ‘health’ of the group (Niskanen *et al.*, 1998). Representing an aggregated look of the group financial position, regulators, customers and investors may find those reports more informative to their needs. It is also “*crucial from a systemic risk viewpoint to have a complete overview of group’s indebtedness, liquidity and profitability*” (Deutsche Bundesbank, 2014, p. 53).

The research of Francis (1986) investigates the amount of information loss due to the disclose of only consolidated statements for firms operating in the USA. In spite of the usefulness of the consolidated statements, individual statements are, according to his results, required to avoid loss of information and the usage of both accounting statements would be advantageous to investors.

According to Burgstahler *et al.* (2004), listed firms are associated with a lower level of earnings management⁷. This happens because listed firms are under a more intensive control by regulators and investors, which improves the transparency of accounting statements. The research of Lopes and Rodrigues (2007) and Gaio and Mateus (2014) show that, in Portugal, large firms and firms audited by the bigger accounting firms are the ones that disclose more detailed and transparent accounting statements⁸.

Literature on this subject defines the accuracy of accounting information in predicting and explaining the firms’ market value as its “value relevance” (Francis and Schipper, 1999; Ali and Hwang, 2000; Barth *et al.*, 2001; Hung and Subramanyam, 2004;

⁷Earnings management is an expression for the accounting techniques that allow corporations to show a better picture of the company’s financial position and business activities than it really is.

⁸ See, for instance, Singhvi and Desai (1971), Cooke (1989), Inchausti (1997) for studies on the same subject but applied to other countries.

Hellström, 2006). This implies that, if the information provided by the accounting reports is truthful and relevant, then it must be reflected in firms' share prices (Prather-Kinsey 2008). Share prices are mainly determined by demand and supply forces, reflecting the investors' confidence in the long-term potential value of a company. Accounting information is, therefore, the base of most investor's predictions, contributing to their equity investment decisions (Hellström 2006).

2.3 Empirical research on the value relevance of accounting information

The majority of the empirical research published within this field is based on the models proposed by Easton and Harris (1991) and Ohlson (1995). The former estimates the annual stock return as a function of the level and/or change values of net income (earnings). The latter represents the firm value or stock price as a linear function of book value of equity and net income. The major difference between these two approaches, in the words of Barth *et al.* (2001), is that Ohlson (1995)'s model reflects the level of the firm's value, while Easton and Harris (1991) focus on what determines the changes in returns over a certain period.

Empirical researches apply the Easton and Harris (1991) and Ohlson (1995) to study the value relevance of accounting statements, yet, with different objectives. In line with our research, a group of studies focus on the comparison of individual and consolidated statements on a value relevance approach. Other studies focus how certain accounting items have an impact on the value relevance of accounting statements. Also, these models are applied to compare the relationship of accounting statements with the market value of firms for different countries, periods and after the adoption of the IFRS.

The evaluation of the advantages of consolidated financial statements can be done through a value relevance approach. Harris *et al.* (1994) research uses a sample of 230 German firms for the years 1982-1991. Accounting data was found significantly connected with returns and stock prices levels. Moreover, the explanatory power of accounting information increased with consolidated statements.

In this context, a pertinent question is: "should parent companies be required to have a dual report (on group and individual levels)?" Müller (2011) addresses this issue studying the accounting information of listed firms in London, Paris and Frankfurt stock markets for the period 2003-2008. Applying a modified Olshon (1995) model on the sample, the main findings of his research are the increasing relevance throughout the period of the

consolidated statements in comparison to individual ones and mixed evidence for the hypothesis of both consolidated and individual statements being more relevant than the simple consolidated one. Müller (2014) and Goncharov *et al.* (2009) reached similar conclusions on the higher relevance of consolidated reports, by considering the value relevance as a metric for reliability and quality of financial statements. Their results suggest that there may not be “*any economic justification to require listed holding companies to publish two sets of accounts using two sets of standards*” Goncharov *et al.* (2009, p. 336). The study of Niskanen *et al.* (1998) also suggest that parent-firm financial statements do not increase the relevance of financial information when consolidated statements are publicly available, using a sample with 35 Finnish listed firms.

According to Hevas *et al.* (2000) “*Knowledgeable investors will value differently the earnings reported by the parent company from the excess group earnings*” (p. 646). This happens because the earnings from the firms is transferred to the parent company in order to be distributed to shareholders. Consequences of these act have different taxes implications (depending on the transfer occurs) and different evaluation by the investors. Empirical results by these authors on data from Athens Stock Exchange contradicts those of Goncharov *et al.* (2009), Müller (2011) and Müller (2014), showing that the explanatory power of valuation models does not improve with consolidation.

A recent study published by Pinto and Silva (2018) for the countries available in ERICA WG⁹ database to assess the value relevance of consolidated statements. The authors use a sample for the period of 2012 to 2016. The results obtained point that consolidated statements are more value relevant in Belgium, Italy, France, Germany and Austria than in Portugal. Further results also pointed that the relevance of consolidated statements increases with the groups’ size and is higher for groups operating in the construction and the energy sectors.

The focus of Dahmash *et al.* (2009) research is on the effects of particular accounting items on the value relevance of financial statements, by examining reported goodwill and identifiable intangible assets in Australian listed firms. The results indicate that these

⁹ European Records of IFRS Consolidated Accounts Working Group (ERICA WG) is composed by representatives of 8 European member-states central banks (Austria, Belgium, France, Germany, Greece, Italy, Portugal and Spain) and representatives of the European Central Bank and IASB. The main focus of ERICA WG is to study the consequences of IFRS implementation and its impact on the European accounting system and balance sheet databases.

accounting items are important to explain the relationship between accounting information and the market value of firms. Barth and Clinch (1998) find similar results about the value relevance of intangible assets and revaluated investments, using a sample of Australian firms for the period 1991 to 1995. Yet, these authors also show that the balance sheet accounting item of 'property, plant and equipment' is not relevant in explaining stock prices.

Abad *et al.* (2000) conduct a similar study on value relevance of parent company and consolidated accounting information, using a sample of firms listed in the Madrid Stock Exchange. These authors focus on minority interest components of earnings and net total assets for the period 1991-1997. The results show that consolidated information outperforms individual ones (on a value relevance perspective), in spite of the small impact of minority interest components of earnings and net total assets for the value relevance of accounting statements. Research and Development (R&D) capitalization¹⁰ is the emphasis of Cazavan-Jeny and Jeanjean (2006) study using a sample of 187 French listed firms for the period of 1993 to 2002. The authors find a negative relation with stock prices, possibly because investors believe that, by capitalizing R&D, there is great possibility of earnings management.

Naceur and Goaid (2004) focus on accounting items such as the dividend policy, book value of debt and capital investment for 30 Tunisian listed firms for the period 1984 to 1997. Despite the relevance of book value and net income, the debt and investment policies do not seem to be relevant for explaining the sample firms value. However, dividend policies seem to be relevant for investors of small firms, which can be seen as required counterpart by investors to allocate capital on small firms.

The contribution of Oliveira *et al.* (2010) to the existing literature includes the study of firms listed in the Portuguese Stock Exchange. Evidence provided by these authors suggest that reported goodwill, net earnings and other intangible assets are determinant to the relationship between accounting information and stock prices. Also, the results suggest that identifiable intangibles are value relevant, even if R&D and intellectual property failed to prove their relevance. In fact, intangible assets are becoming increasingly important to the economies. According to Høegh-Krohn and Knivsflå (2000), intangible assets present a challenge to the accounting profession as well as to the relevance of accounting information.

¹⁰ R&D capitalization consist of accounting R&D as an intangible asset (expecting it will generate economic benefits) and not as an expense. IASB standards, in opposition to certain local GAAPs, propose this solution through IAS 38.

Value relevance research also focuses on distinguishing the explanatory power of net income and book value in countries with different legal systems. In the literature, Ali and Hwang (2000), Arce and Mora (2002), Bartov *et al.* (2005) and Prather-Kinsey *et al.* (2008), show that countries can be labelled in two different groups: common-law countries and code-law countries. In the former, the capital markets have a great influence in financing firms, and accounting standards are more directed to provide shareholders with useful information. In the latter, there is a strong banking system influence, with the tax system having in many cases the dominant influence on the accounting standards. As a consequence, in common-law countries the financial reporting has a greater influence on firms' capital as it diminishes the information asymmetry between firms and shareholders (Bartov *et al.* 2005). There are greater incentives to firms to smooth income in code-law countries, not only for tax imposes, but also because the need of signal positive results to the market is not as important as in common-law countries.

Portugal is generally labelled as a code-law country, with strong banking influence and a small capital market (Lopes and Rodrigues, 2007). Moreover, the market is strongly concentrated in a few financial groups and single families are usually the major shareholders of most of the firms (Alves and Moreira, 2009). According to Oliveira *et al.* (2010), in Portugal the capital market is not typically perceived as the main source of financing by the managers. Thus, "*Portuguese financial reporting is closely related to tax reporting, which encourages income smoothing*" (Morais and Curto, 2008, p. 104). Nonetheless, with the revision of the national accounting standards in 2009¹¹, the Portuguese accounting standards became more flexible to firms' funding through the capital market.

Ali and Hwang (2000)'s research finds that firms in code-law countries display lesser value relevant information than firms in market-oriented ones (common-law countries). The authors use a sample with firms of 16 countries for the period of 1986 to 1995, and obtain results that are consistent with the firms' main financing sources, as investors rely on the disclosure of financial statements to retain information. Also, the higher the level of involvement of the tax system in financial statements, the smaller is the value relevance of the information, whereas the amount of money spent on external auditing services have a positive impact on the relevance of accounting information.

¹¹ *Sistema de Normalização Contabilística* (SNC) became the new accounting system in practice in Portugal, in replacement of the *Plano Oficial de Contabilidade* (POC).

In the same line of thought, Arce and Mora (2002) explore the differences of the value relevance using a sample of firms from 8 European countries, including code-law and common-law countries. According to the authors, financial statements have an increased informational role in countries where financing through equity has a stronger weight. Their results suggest that book value is more relevant in code-law countries than in common-law countries, whereas net income has more explanatory power in common-law countries than in code-law countries.

Besides the legal system, other particularities may have influence on the relationship between accounting information and the firms' market value. For instance, the degree of sophistication of an economy or certain cultural features can influence this relationship. Hellström (2006) compares the value relevance of accounting information between Sweden (as a benchmark of a developed market) and Czech Republic (a transition economy) for the period 1994-2001. The study confirms that, in countries with a better accounting environment (Sweden), the value relevance of financial statements is higher. Nonetheless, as Czech Republic improved the institutional and accounting setting, the gap to Sweden decreased substantially over the years. Lowe (1990) warns that the historical and cultural differences between Japanese and US corporations can lead to a different impact of consolidated statements. The results suggest that Japanese' accounting information is less useful for investors in comparison to US information.

Accounting information may have different value relevance across time and be influenced by historical events. Collins *et al.* (1997) use a sample of USA firms for the period 1953-1993 to find evidence that the value relevance of book value and net income have increased over the period. This may be due to the development of local and international accounting standards over the years, that has a significant influence over the quality and relevance of the accounting information.

Francis and Schipper (1999) find different results for the value relevance of accounting statements, using a sample of USA firms for the period 1954 to 1994. Francis and Shipper (1999) state that information related to net income has lost relevance over the sample period, whereas the value relevance of balance sheet items appear to have increased. In the same way, Lev and Zarowin (1999) document a decline in the relevance of the information, with a weak association between firms' market value and net income, book values and cash flows, using a sample of US firms for the period of 1977 to 1996. According

to these authors, the main reasons for these results may be the changes in the business environment along the years and the insufficient development of new accounting techniques to accommodate those changes.

2.4. International Financial Reporting Standards and value relevance

The preparation of consolidated financial statements is in conformity with the International Financial Reporting Standards (IFRS) since the financial year of 2005. The IFRS became mandatory for listed firms in European Union's (EU) stock markets, following a resolution passed by the European Parliament in 2002¹². These international standards were developed and issued by the International Accounting Standards Board (IASB)¹³. This institution is a non-profit organization which main objective is the development of accounting standards that are globally accepted. With the IFRS implementation in EU, this financial accounting model became the most widely accepted in the world (Hung and Subramanyam, 2004; Paananen and Lin, 2009).

The concept of value relevance is also applied to evaluate the impact of adopting the international standards when compared with not complying with those standards. As defined by Hail (2013), international accounting standards must offer a framework to measure and disclose business operations that are relevant to creditors and other agents.

As a member of the EU, Portugal not only adopted the IFRS (for consolidated accounting statements of listed firms) in 2005, but also converged the national standards of the SNC to the international standards. This shift facilitated the comparison between SNC and IFRS accounting statements and the comparison of Portuguese statements with information disclosed on other countries. Euronext Lisbon is a member of the Euronext trading platform, meaning that IFRS adoption may help international investors to better understand investments opportunities in Portuguese firms (Alves and Moreira, 2009). Portuguese listed firms currently report the consolidated statements according to the international standards.

From the vast literature on the consequences of adopting the IASB's standards, we focus on the impact of the international standards on the value relevance of accounting

¹² See Regulation (EC) No 1606/2002 of the European Parliament and of the Council.

¹³ IASB issued 41 International Accounting Standards (IAS) and 13 IFRS (after 2001). The expression IFRS is used to account for both IAS and IFRS.

information. The literature suggests contradictory evidence. While some authors (Bartov *et al.*, 2005; Jermakowicz *et al.*, 2007; Paglietti, 2009; Aharony *et al.*, 2010; Iatridis, 2010; Suadiye, 2012; Tsalouvas, 2012; Karğın, 2013) find a positive effect of IFRS implementation on the value relevance of accounting information, others (Paananen and Lin, 2009; Khanagha, 2011; Jarva and Lantto, 2012; Hamberg and Beisland, 2014) point to a negative impact, or even no impact at all (Hung and Subramanyam, 2004; Callao *et al.*, 2007; Gjerde *et al.*, 2008; Devalle *et al.*, 2010)¹⁴.

Müller (2014) focus on the impact of IFRS adoption on the value relevance of accounting information, using a sample with firms listed in the Deutsche Börse, London Stock Exchange and NYSE Euronext for the period 2003-2008. The results indicate that adopting the international standards increase the relevance of the consolidated statements of the sample firms. Noteworthy is the fact that, not only consolidated statements seem more relevant than individual ones, but also the mandatory adoption of IFRS on consolidated statements increased this surplus.

In what concerns the Portuguese adoption of IASB standards, the study of Morais and Curto (2008) focus on the comparison of the value relevance of accounting data of 34 Portuguese listed firms for the before (1995-2004) after (2004-2005) periods. The conclusion suggests that the value relevance of accounting information decreases with the adoption of the international standards.

This research intends to apply the approaches of previous authors by comparing the ability of individual vs consolidated accounting statements to explain the market value of the Portuguese non-financial listed firms and which of these are actually favoured by investors when deciding on their capital allocation.

¹⁴ De George *et al.* (2016) provides a complete review of the value relevance studies approaching the adoption of IFRS.

3. Methodology

This research approach includes the analysis of a panel data base, using information on 46 non-financial Portuguese listed firms for the period 2007-2016. This chapter discusses the methodological strategy used in the following way. Section 3.1 describes the advantages of panel data research, as well as the data we are going to deal with along this study. Sections 3.2 describe the theoretical basis and the specification of the model we estimate in order to find a significant link between the value of a corporation and its accounting system. Section 3.3 describe the robustness analysis we conduct to verify the robustness of our results.

3.1. Panel Data

Our data contains observations on two dimensions: time series, specified by the time dimension t , and a cross section dimension specified by the 49 firms observed, noted by i or j . These two dimensions are the basis of panel data sets, which are frequently used in finance researches (Petersen, 2009). Panel data sets can be balanced or unbalanced, whether they contain an equal number of temporal observations for all units. In our case, the panel data set used is unbalanced as it contains missing time-observations for some firms.

Research with panel data sets have advantages over the ones conducted with time-series or cross-sectional data. Hsiao (2003) and Hsiao (2007), among others¹⁵, provide examples of the benefits of using this type of data. Panel data frequently comprises more sample variability, more quantity of information and more degrees of freedom than the other types of data, allowing for more accurate inferences. It also permits to control the impacts of unobserved or missing variables as it covers information on the individuality and intertemporal dynamics of the cross-units (Hsiao, 2007). Consistent with the advantages enumerated by Klevmarken (1989) and Baltagi (2005), the techniques available for this type of data allow to control for individual heterogeneity by using individual-specific dummy variables. As a result, it is possible to address economic problems, that otherwise would be more difficult to analyse, while maintaining efficient statistical inference.

The sample combines data on individual and consolidated accounting statements, extracted from the Central Balance Sheet Division database. The report of accounting statements to the Portuguese authority is in compliance with the Simplified Corporate

¹⁵ For general information on panel data estimation processes, see also Gujarati (2004), Baltagi (2005) and Hill *et al.* (2008).

Information (IES)¹⁶. The accounting information provided undergoes a quality control procedure by the Banco de Portugal before it is available for statistical usage, meaning that the accounting data used in our research went to this validation process. Data on the market values of firms is obtained from the *Sistema Integrado de Estatísticas de Títulos*, gathering information about the stock prices of all listed corporations.

3.2 Price Regression Model (PRM)

The PRM (Ohlson, 1995; Feltham and Ohlson, 1995) specifies a dependence relationship between the value of a firm and its public accounting information. The firm's value, measured by its share price, is viewed as a function of its book value and earnings per share. As explained before, the PRM is based on the idea that the market value of firms is a consequence of investors' decisions using the accounting reports to assist them in their investment decisions.

In spite of the contribution of other authors, the PRM is generally credited to Ohlson (1995) and Feltham and Ohlson (1995). In the words of Kothari (2001): "*Ohlson (1995) and Feltham and Ohlson (1995) deserve credit for successfully reviving the residual income valuation idea, for developing the ideas more rigorously, and for impacting the empirical literature.*" (p. 176).

The PRM formulation is based on the dividend discount model (Gordon, 1959), which equals the market value of a firm to the present value of its future expected dividends. Assuming that $E_t(\cdot)$ represents the expectation of a given value at time t , d_{t+1} is the net dividends paid at time $t+1$, and r is the discount rate, the stock price at time t (P_t) can be written as:

$$P_t = \sum_{t=1}^{\infty} \frac{E_t[d_{t+1}]}{[1+r]^t} \quad (3.1)$$

Thus, the market value represented by P_t depends on the accounting information that is the basis of the knowledge about the present value of future expected dividends.

¹⁶IES is an electronic delivery of accounting, fiscal and statistical information from firms to four different institutions, including Banco de Portugal and the Fiscal Administration, allowing to fulfil several obligations with a single disclosure.

To formulate the PRM, Ohlson (1995) and Feltham and Ohlson (1995) also consider two additional assumptions. The first is known as the ‘*clean surplus relation*’ and shows that the changes in book value between two periods must equal earnings minus dividends¹⁷. The second assumption is based on the idea that paid dividends reduce the book value of the company, but without affecting current earnings¹⁸.

The semi-strong form of market efficiency (Fama, 1970) is a vital hypothesis to explain the way investors adjust to available information. Indeed, this form of market efficiency states that all public available information is taken into account by the market agents when evaluating the market value of firms. Thus, investors use the individual and consolidated accounting statements to adjust their evaluations and expectations.

Taking into account the previous assumptions, Ohlson (1995) and Feltham and Ohlson (1995) specify the PRM as¹⁹:

$$P_{it} = \alpha_0 + \alpha_1 \cdot BVE_{it} + \alpha_2 \cdot NIN_{it} + u_{it} \quad (3.2)$$

Where P_{it} represents the price per share for firm i at time t , BVE_{it} is the book value of equity per share for firm i at time t , NIN_{it} is the net income per share for firm i at time t and u_{it} is an assumed well behaved error term.

Given the specificity of the available data²⁰, we specify the following modified PRM:

$$MV_F_{it} = \theta_0 + \theta_1 \cdot BV_{it} + \theta_2 \cdot NI_{it} + v_{it} \quad (3.3)$$

Where MV_F_{it} is the market value of firm i in the last day of the civil day of year t , the BV_{it} is the book value of equity of firm i in time t , NI_{it} is the net income of firm i in time t and v_{it} is an assumed white noise error term²¹.

¹⁷ The ‘*clean surplus relation*’ can be mathematical formalized as: $bv_t - bv_{t-1} = e_t - d_t$. Where bv_t is the book value at time t , e_t is the earnings at time t and d_t are the net dividends paid at time t .

¹⁸ Following Ohlson (1995), this assumption implies that:

$$\begin{aligned} \partial bv_t / \partial d_t &= -1 \\ \partial e_t / \partial d_t &= 0 \end{aligned}$$

¹⁹ The full mathematical derivation of the model can be found in Ohlson (1995) and Rees (1997).

²⁰ The data does not contain information regarding the number of shares of each firm in the market for the ten-year period. Yet, this may be advantageous because the number of shares of each firm vary along the period, which may have an undesirable effect on the results.

²¹ Given that firms disclose the accounting statements at the end of year t , we establish a relationship between them and the market value at the end of year t . Exceptions are made for 2 listed firms whose main activity is based on sports events and disclose the accounting information in July. We use the market value at the end of $t+1$ for these firms instead of the market value at the end of t .

According to Barth and Clinch (1998), Dahmash *et al.* (2009), Aharony *et al.* (2010) and Hamberg and Beisland (2014), it can be informative to decompose the book value and the net income variables of the PRM in their main components to look for the relevance of specific accounting items in explaining the market value of firms. Given that BV_{it} and NI_{it} are, respectively, the sum of several balance-sheet and income statement accounting items, we can rewrite them as:

$$BV_{it} = \sum_{j=1}^n X(j)_{it} = X(1)_{it} + X(2)_{it} + \dots + X(r)_{it} + \dots + X(n)_{it} \quad (3.4)$$

$$NI_{it} = \sum_{l=1}^m Y(l)_{it} = Y(1)_{it} + Y(2)_{it} + \dots + Y(s)_{it} + \dots + Y(m)_{it} \quad (3.5)$$

Where $X(j)_{it}$, $j = 1, 2, \dots, n$, are the balance-sheet accounting items of firm i at time t included in BV , and $Y(l)_{it}$, $l = 1, 2, \dots, m$, are the income statement accounting items for firm i at time t included in NI . Using this information, we can rewrite model (3.3) in the following way:

$$MV_{Fit} = \beta_0 + \sum_{j=1}^n \delta_j X(j)_{it} + \sum_{l=1}^m \lambda_l Y(l)_{it} + \omega_{it} \quad (3.6)$$

Hence, model (3.6) specifies the balance-sheet accounting items and the income statements accounting items as explanatory variables of the market value of firms. We intend to apply this approach to individual and consolidated accounting information with the purpose of comparing the relevance of the disaggregated items in both cases.

We disaggregate the BV variable into 14 balance-sheet accounting items which are considered to be the most interesting in theory. These items are: ‘*tangible fixed assets*’ (TFA); ‘*intangible assets*’ (IA); ‘*goodwill*’ (GW); ‘*development costs*’ (DC); ‘*investments in related parties*’ (IRP); ‘*inventories and biological assets*’ (IBA); ‘*reserves, retained earnings, dividends and other equity*’ (OTHERBVE); ‘*non-current obtained funding*’ (NC_OFUND); ‘*non-current borrowings and leases*’ (NC_BORLEAS); ‘*non-current bonds issued*’ (NC_BONDS); ‘*other accounts payable*’ (OTHERPAY); ‘*current obtained funding*’ (OFUND); ‘*current borrowings and leases*’ (BORLEAS) and ‘*current bonds issue*’ (BONDS).

We also disaggregate the *NI* variables into 6 income statement items, which are: ‘turnover’ (TURNOVER); ‘costs of goods sold and material consumed’ (GMC); ‘operating net income’ (OPNI), ‘results in financial investments’ (RIF); ‘net financial result’ (NETF) and ‘profit or losses before taxes’ (EBT)²².

Using this information regarding the balance-sheet and the income statement accounting items, model (6) can be rewritten in the following way:

$$\begin{aligned}
MV_{Fit} = & \beta_0 + \delta_1 TFA_{it} + \delta_2 IA_{it} + \dots + \delta_{15} BONDS_{it} + \lambda_1 TURNOVER_{it} \\
& + \lambda_2 GMC_{it} + \dots + \lambda_6 EBT_{it} + \sum_{a=1}^3 \tau_a SECTOR_{it} \\
& + \sum_{b=1}^2 \varphi_b SIZE + \sum_{c=1}^9 \varphi_c YEAR_{it} + \omega_{it}
\end{aligned} \tag{3.7}$$

Where *SECTOR*, *SIZE* and *YEAR* are dummy variables representing, respectively, the sector and the size of the firms and the year of the accounting statements.

3.3 Robustness Analysis

Finally, we apply a robustness analysis to examine how the model can predict the actual market values in the case of individual and consolidated statements. We perform in-sample and out-of-sample forecasting in order to be able to conclude about which of the models using individual or consolidated accounting statements, better predicts the firms’ market values. The in-sample forecasting exercise is implemented using the market value forecasts for the period 2007-2016. The out-of-sample forecasting exercise is implemented by re-estimating the model for the period of 2007-2015 leaving the last year for forecasting purposes. The forecasts for the year 2016 are obtain using the estimation results to predict the market values in 2016. The accuracy of those forecast are measured by the forecast error which is the difference between the actual market values and the market values predicted by the estimated model.

We use the in-sample and the out-of-sample predictions to compare the forecasting performance of the model using individual statements with that of the model using consolidated statements. The comparison uses the most popular measures of forecast

²² Annex 1 provides a full description of these items/variables.

accuracy, that is, the root mean square error (RMSE) and in the mean absolute error (MAE)²³. Lower values for RMSE or MAE indicate better forecasts. The results of the robustness analysis are presented on section 5.3.

²³ For a more extensive definition and formulation of both measures of average model-performance error see Willmott and Matsuura (2005) and Chai and Draxler (2014).

4. Descriptive Statistics

In this section we provide a description of the sample and the variables used on this research to study the value relevance of accounting information. This section proceeds as follows. In section 4.1 we display general information regarding the firms in the sample. In section 4.2 we present statistical information on the variables that are used to estimate the models presented on the previous section. In section 4.3 we present the linear correlation coefficients of the variables. In section 4.4 we execute a unit root test to verify the stationarity of the variables.

4.1 General statistical information regarding the firms in the sample

Our sample includes firms listed on Euronext Lisbon²⁴ for the period of 2007 to 2016. Following Rees (1997) and Dahmash *et al.* (2009), we exclude from the sample all financial firms (e.g. banks and insurance companies) because of the difficulties in comparing their accounting statements with those of other firms²⁵. Firms listed only until June 2007 were excluded, as well as firms with missing individual or consolidated statements. The final sample consists of 394 firm-year observations.

Figure 1 provides information related to the number of firms included in the Portuguese exchange market in each year of the sample period. The number of firms per year is evenly distributed with a minimum of 38 (in the years of 2007 and 2016) and a maximum of 42 (in 2008), indicating a stable number of firms listed in this exchange market. The total number of firms in the sample is 46 and the average stay in the market in the period considered is of 8,57 years. In fact, 28 firms are listed in the Euronext Lisbon for the ten-year period, while only 6 are listed less than 5 years.

Portuguese firms in our sample report the individual accounting statements according to POC (until financial year of 2009 inclusive) or SNC to comply with the national legal framework. Hence, 120 observations report individual statements in accordance with POC, corresponding to near 30% of the sample. On the contrary, all firm-year observations report the consolidated accounting statements according to IFRS. Despite major differences between POC and SNC, accounting items used as variables in our sample are comparable

²⁴ The stock Exchange of Portugal, previously known as *Bolsa de Valores de Lisboa e Porto*.

²⁵ See for example Agostino *et al.* (2011) for a value relevance approach using data of listed banks for the period 2000 to 2006.

after a harmonization process by Banco de Portugal. As a result, data for individual and consolidated accounting statements is compatible.

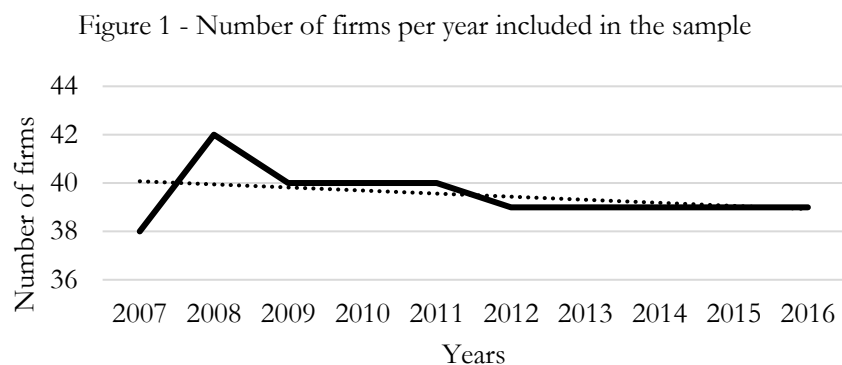


Table 1 displays the criteria adopted to classify firms according to their size and sector. Firms are classified according to their size as small, medium or large group in line with ERICA WG criteria²⁶. The criteria adopted by the ERICA WG is based on the turnover reported in consolidated accounting statements. Firms’ main activity are classified as construction, energy, industry and services based on firms’ NACE codes²⁷. This allow us to analyze the Portuguese business environment on an European perspective.

Table 1 – Criteria to classify firms according to their size and sector

Group size	Criteria according to ERICA WG
Small	Turnover < €250M
Medium	€250M ≤ Turnover ≤ €1500M
Large	Turnover > €1500M
Sector	NACE Codes
Construction	41-43
Energy	05-06, 19 and 35-36
Industry	07-18 and 20-33
Services	37-39, 45-63. 68-82 and 86-96

²⁶ This criterion is the one adopted by ERICA WG in their analyses of the consolidated accounting information disclosed by firms. See Pinto and Silva (2018) for an example on an ERICA WG study.

²⁷ Nomenclature of Economic Activities (NACE) is the European classification of firms according to their business activities.

Table 2 presents information of the weight distribution of groups according to their size and the relative importance of each size on total market value, on total turnover (T) of individual accounting statements (IS) and on total turnover of consolidated accounting statements (CS). Small size groups are the largest share of the total observations (43,91%), followed by groups of medium size (35,28%). In spite of that, small size groups account for 2,57% of the total market value and 7,32% and 2,72% of the total turnover of parent-firms and groups, respectively. By contrast, large groups account for more than 78,14% of the total market values and, respectively, 65,01% and 82,69% of the total turnover of parent-firms and groups. For last, medium firms are 35,28% of the total observations, corresponding to 19,29% of the total market value and 13,24% and 12,47% of the total turnover of parent-firms and groups, respectively.

Table 2 – Share of each group’s size (GS) on total observations (OBS), on total market value (TMV), total turnover of parent-firms (TTPF) and total turnover of groups (TTG)

Groups’ Size	OBS	GS/OBS (%)	GS/TMV (%)	GS/TTPF (%)	GS/TTG (%)
Small	173	43.91	2.57	7.32	2.72
Medium	139	35.28	19.29	27.66	14.59
Large	82	20.81	78.14	65.01	82.69

Figure 2 displays the number of groups of small (S), medium (M) and large (L) size by year in the sample. The number of small groups increased by 14 to 18 (an increase of 28,57%), while the number of medium groups decreased by 17 to 12 (a decrease of 29,41%) between 2007 and 2016. The number of large groups increased by 1 between 2007 and 2016, reaching the maximum in 2012 (10 groups). The decrease of medium groups and the increase of small groups may be explained by the financial crisis that hit the Portuguese and international markets in 2008 with severe consequences to the financial situation of the Portuguese firms. The financial crisis had negative consequences to firms’ production and sales, which is reflected in a decrease of the turnover, the book value of equity and the number of employees.

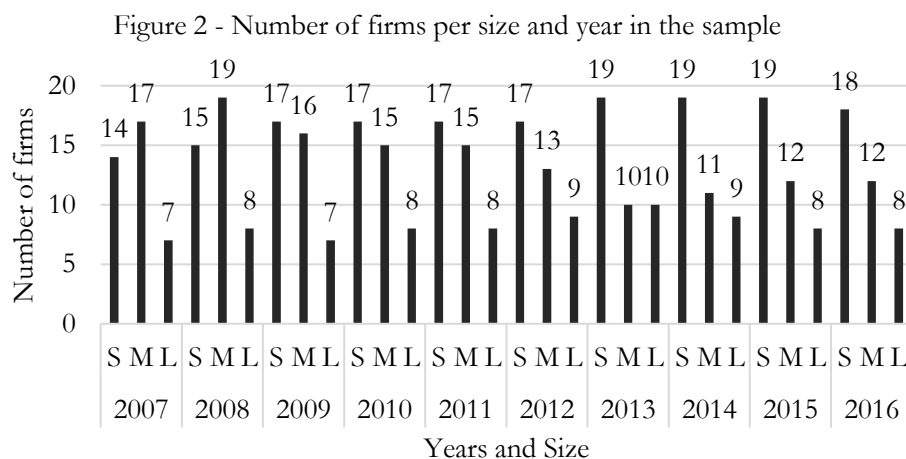


Table 3 presents the share on total observations, total market value, total turnover of parent-firms and total turnover of groups per each firms' sector. Services and Industry are the most represented sectors in our sample, with 58,23% and 26,84% of the firm-year observations. In contrast, Construction (7,59%) and Energy (7,34%) are the sectors with the lowest representation in the sample. Nevertheless, firms in the Energy sector represent about 46% of the total market value, while the industry sector, with a sample weight of 26,84%, represents only 14% of the total market value. These numbers illustrate the influence of the energy sector in the Portuguese business environment despite the small number of firms, whereas the industry sector is characterized by a larger number of firms of a smaller size. Moreover, the energy sector represents the largest share of the total turnover of parent-firms and total turnover of groups.

Table 3 – Share of each sector (SS) on total observations (OBS), on total market value (TMV), total turnover of parent-firms (TTPF) and total turnover of groups (TTG)

Sector	OBS	SS/OBS (%)	SS/TMV (%)	SS/TTPF (%)	SS/TTG (%)
Construction	30	7.59	2.15	3.33	5.61
Energy	29	7.34	45.79	60.13	44.76
Industry	106	26.84	13.98	13.11	12.37
Services	230	58.23	40.44	23.43	37.27

Tables 4 present the observations classified by size and sector according to the criteria defined in table 1. Combining the information on both sector and dimension may allow for better understanding of the economic reality of the listed Portuguese firms. Groups

operating in the services sector are mainly small groups, whereas groups operating in the industry and construction sectors are mainly medium groups. In relation to the energy sector, only medium and large groups operate in that sector. This information highlights the recognized importance of the few but large energy groups to the Portuguese economy, in contrast to the numerous but smaller groups operating in the services sector.

Table 4 – Number of parent-firm observations by sector and size in the sample

Sector per Size	Small group	Medium group	Large group	Total
Construction	5	14	11	30
Energy	0	9	20	29
Industry	32	50	24	106
Services	136	66	27	229
Total	173	139	82	394

4.2 Additional information regarding the main accounting variables

In addition to this information regarding the distribution of parent-firms and groups, it is also informative to underline the importance of certain accounting items for the value relevance of individual and consolidated accounting statements. Annex 2 contains detailed additional information regarding the main variables involved in the equations we estimate in chapter 5. Table 12 of Annex 2 provides detailed information on the balance-sheet accounting items and also on the market value at the end of the year and the average market value of the year. Table 13 of Annex 2 provides detailed information on the income statement accounting items.

Column 1 of table 12 and 13 present the balance-sheet and the income statement variables involved in the equations, respectively. For both tables, columns 2, 3 and 4 display the percentage of observations where the variables' values are different from zero (% obs. \neq 0), the mean and the coefficient of variation (Coef. Variation) as a measure of dispersion. Last, column 5 of table 12 present the weight of each variable on the value of total assets and column 5 of table 13 present the weight of each variable on the value of the turnover.

From column 2 of table 12 it is possible to verify that only in the variable “*investments in related parties*” (IRP) there is a higher percentage of observations that report values different

from zero in individual statements than in consolidated statements. In the rest of the accounting items, consolidated statements report values different from zero on a higher percentage than in individual statements. This is possibly because consolidated accounting statements provide information on a more disaggregated level, whereas in individual statements many accounting items of the subsidiaries are registered as IRP.

The values of the coefficients of variation are superior to 2 for almost all the variables, meaning that the standard deviation is, on average, at least the double of the mean. This suggests that the values of the accounting variables are dispersed of the mean, possibly due to the differences in the dimension of the firms.

Column 5 of table 12 show that only 4 of the 15 balance-sheet accounting variables have a higher weight on total assets in individual statements than in consolidated statements. On the rest 11 balance-sheet accounting items, this weight is higher in consolidated statements. This may be due to the fact that some parent-firms account most of their assets and liabilities as “*investments in related parties*” (IRP), which explains the higher weight on the total assets of this variable in the case of individual accounting statements. For the income statements variables presented on column 5 of table 13, the variables related to production activities (TURNOVER, GMC and OPNI) have a higher weight on net income in the case of consolidated statements. The variables related to the investments in subsidiaries (RIF and NETF) have a higher weight on net income in individual statements. As stated before, this may be due to the fact that most subsidiaries’ operations in individual statements are accounted as investments.

4.3 Linear correlation coefficients of the accounting variables

In Annex 3, we present the linear correlation coefficients of the accounting variables used on the estimations in chapter 5, separating the stock variables (balance-sheet accounting variables) and the flow variables (income statement accounting variables). Tables 14 and 15 show the linear correlation coefficients of the 15 disaggregated balance-sheet accounting variables. Tables 16 and 17 show the linear correlation coefficients of the 6 income statement accounting variables. The tables only highlight the pairs of variables with correlation coefficients above 90%, which may indicate severe collinearity. This problem has as consequences the possible inversion of expected signals and abnormal standard deviations conducting to erroneous insignificance of some of the explanatory variables. In the case of

perfect collinearity, the estimation becomes impossible due to the impossibility of the inversion of the $\mathbf{X}'\mathbf{X}$ matrix.

4.4 The stationary behaviour of the variables

The analysis of the variables used in the modelling process requires the examination to whether a variable has a stationary behaviour or not, that is, whether the shape of the variable's distribution does not change with time. In fact, according to De Mello (2011), nonstationarity may cause "*spurious regressions, invalid inference and forecasting procedures and, generally, make regression results difficult to interpret*" (p. 101).

We execute the Phillips-Perron unit-root test on each accounting variable for individual and consolidated statements. The null hypothesis of the test is that the variable presents a unit-root, that is, an unpredictable pattern. If a variable has a unit-root, the test is re-executed using the variable's first difference in order to examine if it is stationary at the 1st difference. When a variable is already stationary at its original value, it is known as I(0), if it is stationary at the 1st or the 2nd difference, it is known as I(1) or I(2), respectively.

The results of this test are presented on table 15 on Annex 4. In the 1st column of table 15 are the variables names. In the 2nd and 3rd column are the p-values of the unit root tests for the original variable and for the 1st difference of the variable in the case of individual statements. In the 4th and 5th column are the p-values of the unit root tests for the original variable and for the 1st difference of the variable in the case of consolidated statements.

For a 5% significance level we reject the null in the unit-root test for all variables, except GW, TUNROVER and GMC in individual statements. We execute unit-root using the 1st difference of these last 3 variables and the results show that these variables are I(1). In consolidated statements, we reject the null in the unit-root test for all variables for a 5% significance level, except for TFA, DC and GMC. The unit-root tests using the 1st differences indicate that these variables are I(1).

Given that we reject the null hypothesis for some variables in both individual and consolidated statements, further tests on the estimation results presented on section 5.1 are needed in order to guarantee valid inferences.

5. Empirical results

In this section we present the estimation results of model (7), which is separately estimated for individual and consolidated accounting statements. The method adopted is the Generalized Least Squares (GLS) with cross section weights and time fixed effects. Cross section weights mean that the GLS assumes cross-section heteroscedasticity whereas time fixed effects refers to the inclusion of year-dummy variables.

These options were made based on the usual testing methods, such as the White (1980) general heteroscedasticity test. For both individual and consolidated statements, we reject the null hypothesis of homoscedasticity, therefore using the cross-section weights to obtain a consistent estimator for the variables and covariances matrix. The reasons for heteroscedasticity may be related with the heterogeneity of the accounting statements of firms across the sample.

The choice for the time fixed effects is based on a Hausman (1978) specification test. The null hypothesis of the test is that the random effects model and the fixed effects model are not significantly different (Gujarati, 2004). The result of the test rejects the null hypothesis, indicating the option for the fixed effects.

In this section we present and discuss the empirical results previously obtained in the following order. In section 5.1., we present and compare the results of the estimations of the modified price regression model (3.7) using individual and consolidated statements. In section 5.2, we compare and discuss the results obtained using individual and consolidated statements. In section 5.3, we conduct the robustness analysis previously described (section 3.3), to assess the consistency of our estimation results.

5.1 Estimation results of the modified PRM

Table 5 and 6 present the estimations results of model (3.7) for individual and consolidated accounting statements, respectively. Using Hendry (1995)'s general-to-specific approach²⁸ we get a parsimonious final model which is statistically robust and theoretically plausible.

²⁸ The general-to-specific approach consists of specifying the model including all the possible variables assumed to be relevant determinants of the dependent variable analysis and sequentially eliminating the variables that do not obey the statistical criteria previously established for given confidence intervals. See Campos *et al.* (2005) for an overview of the general-to-specific modelling.

In the first column of table 5 appear the names of the variables. The second column shows the coefficients' estimators and respective p-values (in parenthesis) for the initial general model. The third column depicts the coefficients' estimators and respective p-values (in parenthesis) of the final parsimonious model.

We focus the analysis on the estimation results of the final model. The results presented on table 5 show that all variables are individually statistically significant at the 1% significance level, except for BORLEAS and MEDIUM that are significant only at the significance level of 3% and 6%, respectively. This model has a F-statistic of 74,61 with a p-value of 0,000, indicating that the general results of the model are statistically significant, and an adjusted R² of 0,781, meaning that 78,1% of the variations of the dependent variable are explained by the model. Thus, the results show that accounting information can explain the evaluation that investors make about the firms' market value.

Notwithstanding, the regression results may appear robust but still underline a spurious relationship between the dependent and the explanatory variables (De Mello, 2011). A unit root test is executed on the estimation residuals in order to verify if the residuals do not follow a trend, that is, if they are stationary. The nonstationarity of the residuals may lead to a spurious relationship between the explanatory and the independent variable²⁹. The Phillips-Perron unit-root test on the estimation residuals displays a p-value of 0,000, clearly rejecting the null hypothesis of nonstationarity and, therefore, indicating that the relationship between the dependent and the explanatory variables is not spurious.

Given that all variables are measured in thousands of euros, the coefficients' estimators indicate the impact, on the dependent variable (in thousands €), caused by one-unit absolute change (1.000€) in the explanatory variables, *ceteris paribus*. The regressors with higher positive impact are the '*operating net income*' (OPNI) and the '*goodwill*' (GW), with an average increase of 2.512€ and 1.255€, respectively, in the market values for each 1.000€ increase in those accounting items. TFA, IRP, OTHERBVE and NETF are also accounting items with a positive impact on the dependent variable, but of smaller dimension.

The only variable with a negative impact on the market value is the '*current borrowings and leases*' (BORLEAS). The estimation results show that a change of 1.000€ on BORLEAS

²⁹ See Granger and Newbold (1973) and Granger (1986) for the importance of variables' cointegration and stationary residuals to appropriate formulations.

Table 5 – Estimation results of model (3.7) for individual accounting statements (p-values are in parentheses)

Variables	Initial model		Final model	
	Coefficients		Coefficients	
C	174.823,400	(0,000)	189358,600	(0,000)
TFA	0,877	(0,000)	0,878	(0,000)
GW	1,255	(0,001)	1,452	(0,000)
DC	25,487	(0,277)		
IRP	0,324	(0,000)	0,290	(0,000)
OTHERBVE	0,723	(0,000)	0,541	(0,000)
NC_BORLEAS	-0,313	(0,493)		
NC_BONDS	-0,312	(0,042)		
OTHERPAY	-0,222	(0,801)		
BORLEAS	-1,464	(0,004)	-1,133	(0,024)
BONDS	-0,158	(0,408)		
GMC	-0,725	(0,048)		
OPNI	3,973	(0,000)	2,512	(0,000)
NETF	0,740	(0,009)	0,662	(0,008)
ENERGY	3.947.520,000	(0,000)	4.149.792,000	(0,000)
CONSTRUCTION	-100.535,600	(0,278)		
INDUSTRY	-8.060,468	(0,836)		
MEDIUM	84.151,280	(0,008)	48.100,240	(0,055)
LARGE	817.471,000	(0,000)	850.535,200	(0,000)
Y2008	-179.318,900	(0,002)	-182.683,800	(0,000)
Y2009	-125.153,300	(0,033)	-160.044,500	(0,001)
Y2010	-151.186,800	(0,010)	-180.299,100	(0,000)
Y2011	-191.063,100	(0,001)	-209.173,600	(0,000)
Y2012	-206310,500	(0,001)	-223.143,100	(0,000)
Y2013	-177.431,200	(0,002)	-183.226,100	(0,000)
Y2014	-146.184,300	(0,011)	-171.162,900	(0,001)
Y2015	-106.722,800	(0,061)	-149.209,300	(0,003)
Y2016	-138.567,200	(0,015)	-154.010,100	(0,002)

has an impact, on average, of -1.133€ on the market value. This may be related to how the ‘*current borrowings and leases*’ indicates if firms can pay their short-term financial obligations.

In what concerns the coefficients of the dummy variables related to the activity sector, the results show that firms in the energy sector are positively related with a higher market value than those in the services sector (base class). In fact, firms operating in the energy sector have, on average, a market value of 4.149 million € higher than the services sector. The impact on the market value of the construction and industry sectors is not statistically different from the impact of the services sector.

The estimation results for the size dummies variables indicate that the group’s size is positively related with the market values, that is, the bigger the groups, the higher its market

value. These results were expected since the criteria adopted to classify groups by size is based on the turnover. Medium size firms have an estimated market value of about 48 million euros higher than small size firms, on average. Large size firms have a market value of about 851 million euros higher than small size firms, on average.

Regarding the year dummy variables, all of them are statistically significant and negative, meaning that relative to 2007 (year base), the average market values decreased systematically during the sample period. In 2012, the market values are, on average, minus 223 million € than the market values of 2007. The years of 2011, 2012 and 2013 present even more negative values for the market value of firms relative to 2007. This may be explained by the severe global financial crisis that hit the European markets from 2008 onwards, with negative consequences to national and international firms. This financial crisis had a negative impact on the market value of firms in, at least, two ways. First, it decreased the revenues while increasing the expenses of the firms, which has a negative impact on the market values. Second, the loss of confidence of investors on a expedite economic recovery and on the financial system decreased their evaluation of the firms' value.

Table 6 presents the estimation of model (3.7) for the consolidated accounting statements, presented in the same way as those of individual statements (table 5). All the variables are individually statistically significant in the final parsimonious model at the 5% significance level, excluding the dummy variables of 2009 and 2015 and the dummy variable of the industry sector. This model has a F-statistic of 121,025 with a p-value of 0,000, indicating that the general results of the model are statistically significant. The adjusted R-squared of 0,859 means that 85,9% of the variations of the dependent variable are explained by the model.

The Phillips-Perron unit-root test on the estimation residuals show a p-value of 0,000, rejecting the null hypothesis of nonstationarity. We conclude that the economic relationship between the market value of firms (dependent variable) and the accounting information (explanatory variables) is not spurious.

The regressors with higher positive impact on the dependent variable are the '*development costs*' (DC) and the '*earnings before taxes*' (EBT), with an effect of, respectively, 3.444€ and 2.968€ on the dependent variable for each 1.000€ change in those accounting items, *ceteris paribus*. GW, OTHERBVE and TURNOVER are the other accounting items with a positive impact on the market value of firms, but of smaller dimension.

Table 6 – Estimation results of model (3.7) for consolidated accounting statements (p-values in parentheses).

Variables	Initial Model		Final model	
	Coefficients		Coefficients	
C	108947,300	(0,002)	110.964,800	(0,002)
GW	0,368	(0,002)	0,343	(0,002)
DC	3,352	(0,000)	3,444	(0,000)
IRP	-0,013	(0,939)		
IBA	-0,125	(0,551)		
OTHEREBVE	0,479	(0,000)	0,473	(0,000)
NC_BORLEAS	-0,235	(0,044)	-0,245	(0,012)
OTHERPAY	0,005	(0,980)		
BORLEAS	-0,654	(0,002)	-0,692	(0,000)
BONDS	-0,314	(0,050)	-0,354	(0,014)
TURNOVER	0,413	(0,000)	0,392	(0,000)
RIF	-0,383	(0,717)		
NETF	0,701	(0,370)		
EBT	2,880	(0,000)	2,968	(0,000)
ENERGY	652.626,400	(0,000)	642.268,700	(0,000)
INDUSTRY	35.422,800	(0,169)	42.469,000	(0,057)
CONSTRUCTION	-22.912,410	(0,704)		
MEDIUM	16.336,400	(0,586)		
LARGE	196.546,100	(0,084)	169.258,200	(0,074)
Y2008	-96.360,790	(0,027)	-99.602,100	(0,027)
Y2009	-65.691,450	(0,131)	-67.593,820	(0,133)
Y2010	-112.250,300	(0,010)	-108.205,100	(0,016)
Y2011	-136.750,100	(0,002)	-134.800,200	(0,003)
Y2012	-139.989,000	(0,002)	-132.172,100	(0,004)
Y2013	-110.447,700	(0,012)	-98.608,060	(0,029)
Y2014	-97.844,870	(0,025)	-94.476,530	(0,036)
Y2015	-66.005,110	(0,129)	-69.613.,390	(0,120)
Y2016	-79.410,940	(0,068)	-81.200,760	(0,070)

The explanatory variables with a negative impact are the ‘*non-current borrowings and leases*’ (NC_BORLEAS), ‘*current borrowings and leases*’ (BORLEAS) and ‘*current bonds*’ (BONDS), which, on average, impose a decrease of 245€, 692€ and 354€ on the market value for each 1.000€ increase in those explanatory variables, respectively.

In what concerns the coefficients of the dummy variables related to the activity sector, the results show that firms in the energy and industry sectors are positively related to a higher firms’ market values in comparison to operating in the services sector (base class). However, operating in the industry sector is only statistically different from the services sector when one considerer a significance level of 5,7%. Firms operating in the energy sector

have, on average, a market value higher in 642 million of euros than firms operating in the services sector. The impact on the market value of the construction sector is not statistically different from the impact of the services sector.

In relation to the coefficients estimations of the size dummy variables, the estimation results indicate that parent-firms of groups of large size have, on average, higher market values in near 169 million euros than parent-firms of groups of small size. Notwithstanding, there is no statistical evidence that parent-firms of medium groups have higher market values in comparison to parent-firms of small groups.

In what regards the year dummy variables, the estimation results indicate a decrease on the average market values in comparison with 2007. However, for the years of 2009 and 2015, there is only statistical significance of a decrease in the market values when we consider a significance level higher than 10%. The year of 2011 is the one with lower market values when compared with the year of 2007.

5.2 Comparison of the relevance of individual and consolidated accounting statements on the market value of firms

The estimation results presented in tables 5 and 6 indicate that the accounting information in both individual and consolidated statements explain the firms' market value in a reliable and consistent way. Thus, we can argue that the accounting information disclosed by firms is relevant for the investors' decisions about the firms' market values and, consequently, about their investment decisions.

The accounting variables that are simultaneously common and significant in both individual and consolidated statements are GW, OTHERBVE and BORLEAS. The ones that significant in the individual statements but not in consolidated statements are IRP and NETF, and the ones that are significant in consolidated statements but not in individual statements are DC, NC_BORLEAS and BONDS. We used a Wald test to verify if the accounting variables that are significant in both cases have the same impact on the dependent variable or not. The null hypothesis of the test is that the impact of the variable is statistically equal in both individual and consolidated statements.

We reject the null of equal coefficients the GW variable in both models. This indicates that the impact of '*goodwill*' (GW) is higher in the case of the individual accounting

statements than in the case of consolidated statements. ‘*Goodwill*’ is an intangible asset that represents the patents, industry rights, brands and other non-physical assets that a firm acquires when buying another one. The result indicates that this intangible asset is more relevant to investors using individual statements than when using consolidated statements.

In what concerns the variable OTHERBVE, we also reject the null of equal values in both statements, but for a significance level of 10%. The variable OTHERBVE includes the items of reserves, retained earnings, dividends and other equity items. These items are seen by investors as sources of information to support their investments’ decisions, which may explain their importance in the relationship between accounting information and firms’ market values in both statements.

For the accounting variable of BORLEAS, we reject the null of equal values which indicates that the impact of the variables may be higher in individual statements than in consolidated statements. BORLEAS represents the firms’ current borrowings from financial institutions and leases, that is, current liabilities which are important for investors to determine if a company is ‘healthy’ enough to pay its short-term obligations. Yet, the non-current borrowings and leases are only significant for consolidated statements. Therefore, it highlights the importance of the firms medium and long-term financing options that reflect the group’s financial situation.

The estimation results also indicates that IRP and NETF are statistically significant with a positive impact, but only in individual statements. These variables include, respectively, the investments in subsidiaries and the net results of those investments. Given that parent-firms consider most of their subsidiaries’ activities as investments when reporting individual statements, while consolidated statements disregard the intra-group financial links, the results above are expected as IRP and NETF are only significant in individual statements. On the other hand, the variable DC which includes R&D costs is only significant in consolidated statements. The reason may be that most of the development costs of subsidiaries are accounted in the IRP item in individual statements, while in consolidated statements these values are accounted in the DC item.

Regarding the sector of activity, the estimation results show that, on average, firms in the energy sector have a market value higher than those in the services sector. This may be explained by the fact that the 29 observations of the energy sector have 45.79% of the total market value, that is, listed firms in the energy sector have market values significantly

higher than firms of any other sectors. The listed firms in the energy business may be viewed by investors and other market agents as the backbone of the Portuguese economy.

We use the Wald test to check if the dummy variable of the energy sector has the same coefficient in individual and consolidated statements. The result of the test indicates that the impact is statistically different and, therefore, the energy sector may have a greater impact in the case of individual statements than in the case of consolidated statements. On the other hand, the influence of the construction sector is not different that of the services sector, while the industry sector dummy is only statistically significant in consolidated statements.

In what concerns relation the groups' sizes, the estimation results in tables 5 and 6 show that the firms of larger groups have higher market values estimates than the those of smaller groups. We use the Wald test to check if the large size groups have different coefficients in individual and consolidated statements. We reject the null of equality and conclude that the impact of the large size groups is higher in the case of individual statements than in the case of consolidated statements. The dummy medium size groups is only significant in the case of individual statements.

The impact of the fiscal years dummies are all negative in both type of statements. However, the year of 2012 is the one causing a more negative impact on the firms' market value relative to year base 2007 for both statements. Once again, we use the Wald test to check if the impact of the year dummies are identical in both individual and consolidated statements. The results indicate that the impacts are statistically different for the years 2008, 2009, 2012 and 2014, and higher in the individual accounting statements than in consolidated statements. For the rest of the years the results indicate that the impact of the year dummies are identical in individual and consolidated statements. In the individual statements the variables are all significant at a 1% level, while in consolidated statements they are significant only at higher levels of confidence, except for the year of 2011. In both cases statements, the estimation results for the year dummy variables may be explained by the severe financial crisis that had negative consequences on the economic situation of the national and international firms with particular strength on small open economies like the Portuguese one.

5.3 Results of the robustness analysis

We perform a robustness analysis (referred to in section 3.3) for assessing the statistical robustness of the estimation results and for comparing the economic relevance of individual and consolidated statements.

Figures 3 and 4 in annex 5 present the results of an in-sample forecasting exercise based on the individual and consolidated final models. The idea of this in-sample forecasting is to compare the values of the root mean squared error (RMSE) and the mean absolute error (MAE) obtained for both final models, in order to assess which one better predicts the market values over the 10-year period.

The results for the model using individual statements show a RMSE of 1.359.944 and a MAE of 574.453. The results for the model using consolidated statements are a RMSE of 832.948,3 and a MAE of 381.513,8. These results indicate lower values for the model with consolidated statements than for the model with individual ones, suggesting that the former produce more accurate predictions than the latter.

Additionally, we obtain the out-of-sample forecasts from both models, estimating them for the period of 2007-2015, leaving out the 2016 observations to predict the market value of firms in that year.

The results for the individual statements show a RMSE of 1.579.393 and a MAE of 748.177. The results for the consolidated statements are a RMSE of 821.689 and a MAE of 444.693. The comparison of these results indicates that the model using consolidated statements predicts better the market values for 2016 than the model using individual statements.

The in-sample and the out-of-sample forecasts obtained support our claim of robust results and the decision on which of the final models predict better the actual market values. Indeed, both types of forecasting show that the model using consolidated statements outperforms the one using individual statements. This may suggest that consolidated accounting information can better predict the market value of firms than individual information and, therefore, can be preferentially used by investors to guide their investment decisions.

6. Conclusion

This report establishes a comparison between the value relevance of individual and consolidated accounting information for 46 Portuguese non-financial listed firms for the period of 2007-2016. Accounting information provides investors with valuable knowledge that enables them to frame their investment decisions. Therefore, the above-mentioned comparison is able to decide on how the accounting information can explain and predict the market value of firms. By doing so, this report contributes to the understanding of how the accounting information influences the investors' capital allocation decisions, while providing a good measure of the quality of accounting information.

We developed a modified PRM (Ohlson, 1995; Feltham and Ohlson, 1995) to measure the extent to which market value is explained by accounting information. This modified PRM specifies the firms' market value as a linear function of several balance-sheet and income statement items. In addition, we included variables representing the size and sector of the firms to see how these features are related with the market values. To the best of our knowledge, this modified PRM is new in the literature and contributes to extend the scarce existing literature on this particular aspect of the research. The necessary information to perform our analysis was provided by BdP.

The estimation results of the modified PRM allowed us to yield several conclusions. First, the estimation results show that different accounting items are relevant to explain the market value of firms in individual and consolidated statements. This may be justified by the different characteristics of individual and consolidated statements, given that, in individual statements, the parent-firms account their subsidiaries' activities as investments while in consolidated statements, the parent-firms disaggregate the subsidiaries' activities in different items. Yet, the accounting items of *'goodwill'*, *'reserves, retained earnings, dividends and other equity items'* and *'current borrowings and leases'* are relevant in both type of statements, highlighting the importance of those items for the value relevance of accounting information.

Second, we conclude that firms of large groups have higher market values on average, when compared to firms of small groups. In what concerns the sector of activity, we conclude that firms belonging to the energy sector have, on average, higher market values than those of firms operating in the services sector, for both individual and consolidated statements. This relative advantage of the firms in the energy sector may be explained by the heavy weight of the energy sector in the Portuguese economy.

Third, in what concerns the period of 2007-2016, market values are, on average, smaller between 2008 and 2016 than in 2007, for individual and consolidated accounting statements. These results may be explained by the severe global financial crisis that hit the European markets in 2008, with severe negative consequences to the majority of Portuguese firms. The global financial crisis decreased the firms' production and sales, as well as all economic agents' confidence.

The key conclusions of this report is that individual and consolidated accounting information is significantly related to the market value of firms and, consequently, to how investors allocate their investment decisions. We also compare the estimation results of the modified PRM using individual and consolidated statements and its predictive performance of the actual market values of firms. This comparison suggests that consolidated accounting information better predicts the market value of firms than individual information, as the model using consolidated statements obtains forecasts closer to the actual market values.

By focusing on the Portuguese listed firms, the results obtained with this research can also be compared with the ones of the existing literature. In what concerns the relevance of accounting information, our results are in line with the ones of Harris *et al.* (1994), Niskanen *et al.* (1998), Abad *et al.* (2000), Goncharov *et al.* (2009), Müller (2011) and Müller (2014). These authors suggest that consolidated accounting information are more relevant to investors than individual accounting information. Our research also finds that consolidated accounting information better predicts the market value of firms than individual statements. Additionally, our results are consistent with Barth and Clinch (1998), Dahmash *et al.* (2009) and Oliveira *et al.* (2010), in showing that the intangible assets are relevant to investors' decisions.

This research contributes further to the existent literature with valuable new information on the subject of the value relevance of accounting information, and on the ways in which investors use the information disclosed by firms to decide where allocate their capital. We believe that the modified PRM we developed can validly contribute to future research in this domain.

Nevertheless, it seems important to also enumerate some of the main limitations related to this research. Investment decisions are made based on information regarding different aspects of the firms, markets and countries and not only on accounting information. Investors' confidence, market dynamism and the level of liquidity are among the main factors

influencing investors decisions (Pinto and Silva, 2018). The results obtained here should not be generalized to firms listed on other countries or to financial firms, as we focus only on the national non-financial listed firms. Still, our research contributes to the value relevance studies and enables the comparison of the results obtained with the ones that focus on other countries. According to Barth *et al.* (2001), value relevance studies are not sufficient or necessary for the decisions of the standard setters, as accounting information is not only used by equity investors. Even so, addressing the relationship between accounting statements and firms' market value is a relevant way of assessing the quality of accounting information and how investors may use it.

Future research could be done by applying the modified PRM to different countries, allowing for a more accurate comparison of the results as well as for studying how countries' specific features can influence the relationship between accounting information and the firms' market values. The results reported in this study emphasize the importance of encouraging the efforts of firms in disclosing transparent and reliable accounting statements, as well as the efforts of the institutions that supervise them. These efforts may result in a better allocation of capital, that is, more productive and innovative investments that may contribute to a stronger and growing economy.

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Annex 1

Table 7 - Description of the main balance-sheet accounting statements under study

CODE	Assets	Description
TFA	Tangible fixed assets	Assets with physical form such as property, plant, equipment, investment property and biological assets.
IA	Intangible assets	Nonphysical assets. Includes goodwill, development costs, patents, trademarks and copyrights.
GW	Of which, goodwill	Excess of the cost of an acquisition over the acquirer's interest. Value paid for the acquired company's brand or customer base.
DC	Of which, development costs	Research and Development (R&D) capitalized in intangible assets. Costs related to researching.
IRP	Investments in related parties	Investments in subsidiaries, associates and joint ventures.
IBA	Inventories and biological assets	Assets held for sale in the ordinary course of business.
CODE	Equity	Description
OTHERBVE	Reserves, retained earnings, dividends and other equity	Comprises firm's reserves, retained earnings (includes profit or loss of the year and dividends paid in advance), dividends and other equity.
CODE	Liabilities	Description
NC_OFUND	Non-current obtained funding	Interest-bearing borrowings (non-current).
NC_BORLEAS	Of which, borrowings and leases	Borrowings from financial institutions and leases accorded by the firms (non-current).
NC_BONDS	Of which, bonds issue	Bonds delivered by the firms to investors (non-current).
OTHERPAY	Other accounts payable	Deferred income and other non-interest-bearing liabilities, including derivatives and trade payables.
OFUND	Current obtained funding	Interest-bearing borrowings (current).
BORLEAS	Of which, borrowings and leases	Borrowings from financial institutions and leases accorded by the firms (current).
BONDS	Of which, bonds issue	Bonds delivered by the firms to investors (current).

Table 8 - Description of the main income statement items under study

CODE	Income Statement	Description
TURNOVER	Turnover	Sale of goods, rendering services and revenue from constructing contracts.
GMC	Costs of goods sold and material consumed	Raw materials and consumables used.
OPNI	Operating net income	Profit (loss) from operating activities.
RIF	Results of financial investments	Gains and losses from financial instruments.
NETF	Net financial result	Includes the difference between finance income and finance costs, gains (loss) from financial instruments, exchange differences recognized and profit (loss) from investments in related parties.
EBT	Profit (loss) before tax	Earnings before tax (EBT).
NI	Net income	Profit (loss) from continuing and discontinued operations, net of tax.
DIV	Dividends distributed (owners and non-controlling Interests)	Distribution to shareholders of a portion of a company's earnings.

Annex 2

Table 9 – Additional information regarding the balance-sheet accounting items

Variable	% obs. ≠ 0	Mean	Coef. Variation	% Total Assets (TA)
TFA_I	89.1	43381.5	7.2	2.8
TFA_C	100.0	1235447.7	2.8	57.9
IA_I	60.7	26929.6	3.0	1.7
IA_C	95.7	612927.1	2.5	28.7
GW_I	24.1	20460.3	3.6	1.3
GW_C	78.9	246662.2	2.4	11.6
DC_I	11.4	74.7	5.6	0.0
DC_C	25.4	7772.8	10.5	0.4
IRP_I	97.0	893753.6	2.3	57.2
IRP_C	75.4	89298.5	3.0	4.2
IBA_I	22.1	3061.7	4.1	0.2
IBA_C	96.7	137653.3	1.9	6.4
OTHERBVE_I	100.0	379175.9	2.1	24.3
OTHERBVE_C	100.0	364141.1	2.7	17.1
NC_OFUND_I	81.7	407035.2	3.3	26.1
NC_OFUND_C	99.0	981486.2	2.6	46.0
NC_BORLEAS_I	64.7	73965.9	2.8	4.7
NC_BORLEAS_C	95.9	386779.8	2.4	18.1
NC_BONDS_I	46.4	259248.7	3.3	16.6
NC_BONDS_C	58.1	553461.9	2.9	25.9
OTHERPAY_I	36.3	6285.1	5.0	0.4
OTHERPAY_C	85.0	152959.8	4.1	7.2
OFUND_I	95.2	253558.8	3.2	16.2
OFUND_C	100.0	281284.9	2.1	13.2
BORLEAS_I	82.5	28765.9	2.9	1.8
BORLEAS_C	97.2	124675.7	1.9	5.8

BONDS_I	52.8	182119.3	3.7	11.7
BONDS_C	56.9	128838.8	2.9	6.0

Each variable labelled with ‘_C’ or ‘_I’ indicates that the variable represents an accounting item of a consolidated statement or an individual statement. The coefficient of variation is equal to the absolute value of the ratio of the standard deviation to the mean.

Table 10 – Additional information regarding the income statement accounting items

Variable	% obs. ≠ 0	Mean	Coef. Variation	% NI
TURNOVER_I	79.4	95599.9	3.9	137.6
TURNOVER_C	100.0	1727621.2	2.1	1861.2
GMC_I	24.4	-66829.3	-5.0	-96.2
GMC_C	94.4	-908586.2	-2.9	-978.8
OPNI_I	100.0	1221.7	53.6	1.8
OPNI_C	100.0	145030.6	2.4	156.2
NETF_I	100.0	66390.4	4.6	99.2
NETF_C	100.0	-38759.6	-3.1	11.2
EBT_I	100.0	67612.1	4.4	95.6
EBT_C	100	105009.3	2.7	-41.8
NI_I	100.0	69480.6	4.3	97.3
NI_C	100.0	92825.2	4.0	113.1
RIF_I	69.5	68958.8	4.4	100.0
RIF_C	62.7	10403.2	6.4	100.0

Each variable labelled with ‘_C’ or ‘_I’ indicates that the variable represents an accounting item of a consolidated statement or an individual statement. The coefficient of variation is equal to the absolute value of the ratio of the standard deviation to the mean.

Annex 3

Table 11 - Correlation matrix of the variables of the balance-sheet accounting items of consolidated statements

	TFA	IA	BVE	OTHER BVE	NC OFUND	NC BORLEAS	NC BONDS	OTHER PAY	OFUND	BONDS
TFA	1.00	0.85	<u>0.95</u>	0.81	<u>0.95</u>	<u>0.91</u>	<u>0.93</u>	<u>0.95</u>	0.89	0.86
IA	0.85	1.00	0.86	0.78	<u>0.93</u>	<u>0.90</u>	<u>0.91</u>	0.83	0.87	0.83
BVE	<u>0.95</u>	0.86	1.00	<u>0.92</u>	<u>0.92</u>	0.88	<u>0.91</u>	0.87	0.85	0.80
OTHERBVE	0.81	0.78	<u>0.92</u>	1.00	0.83	0.77	0.83	0.72	0.76	0.71
NC_OFUND	<u>0.95</u>	<u>0.93</u>	<u>0.92</u>	0.83	1.00	<u>0.95</u>	<u>0.98</u>	<u>0.89</u>	<u>0.92</u>	0.87
NC_BORLEAS	<u>0.91</u>	<u>0.90</u>	0.88	0.77	<u>0.95</u>	1.00	0.89	0.86	0.88	0.81
NC_BONDS	<u>0.93</u>	<u>0.91</u>	<u>0.91</u>	0.83	<u>0.98</u>	0.89	1.00	0.88	<u>0.90</u>	0.87
OTHERPAY	<u>0.95</u>	0.83	0.87	0.72	0.89	0.86	0.88	1.00	0.86	0.86
OFUND	0.89	0.87	0.85	0.76	<u>0.92</u>	0.88	<u>0.90</u>	0.86	1.00	<u>0.93</u>
BONDS	0.86	0.83	0.80	0.71	0.87	0.81	0.87	0.86	<u>0.93</u>	1.00

Table 12 - Correlation matrix of the variables of the balance-sheet accounting items of individual accounting statements

	IA	GW	BVE	OTHER BVE	NC BONDS	OFUND	BONDS
IA	1.00	<u>0.92</u>	0.04	0.07	0.07	0.02	0.02
GW	<u>0.92</u>	1.00	0.06	0.09	0.06	0.02	0.03
BVE	0.04	0.06	1.00	<u>0.93</u>	0.72	0.74	0.71
OTHERBVE	0.07	0.09	<u>0.93</u>	1.00	0.69	0.63	0.58
NC_OFUND	0.05	0.03	0.83	0.74	<u>0.94</u>	0.67	0.67
OFUND	0.02	0.02	0.74	0.63	0.44	1.00	<u>0.99</u>
BONDS	0.02	0.03	0.71	0.58	0.42	<u>0.99</u>	1.00

Table 13 - Correlation matrix of the variables of the income statement accounting items of consolidated statements

	TURNOVER	GMC	OPNI	EBT
TURNOVER	1.00	<u>-0.90</u>	0.77	0.77
GMC	<u>-0.90</u>	1.00	-0.63	-0.63
OPNI	0.77	-0.63	1.00	<u>0.96</u>
EBT	0.77	-0.63	<u>0.96</u>	1.00

Table 14 - Correlation matrix of the variables of the income statement accounting items of parent-firm statements

	TURNOVER	GMC	RIF	NETF	EBT	NI
TURNOVER	1.00	<u>-0.98</u>	0.25	0.32	0.33	0.34
GMC	<u>-0.98</u>	1.00	-0.26	-0.35	-0.33	-0.34
RIF	0.25	-0.26	1.00	<u>0.96</u>	<u>0.96</u>	<u>0.96</u>
NETF	0.32	-0.35	0.96	1.00	<u>0.98</u>	<u>0.98</u>
EBT	0.33	-0.33	<u>0.96</u>	<u>0.98</u>	1.00	<u>1.00</u>
NI	0.34	-0.34	<u>0.96</u>	<u>0.98</u>	<u>1.00</u>	<u>1.00</u>

Annex 4

Table 15 – Results of the unit root tests for individual and consolidated statements (p-values in parenthesis)				
Variables	Individual statements		Consolidated statements	
	Test on the original variable	Test on the 1 st difference	Test on the original variable	Test on the 1 st difference
MV_F	(0.000)		(0.000)	
TFA	(0.000)		(0.071)	(0.000)
GW	(0.389)	(0.000)	(0.001)	
DC	(0.025)		(0.678)	(0.000)
IRP	(0.004)		(0.000)	
IBA	(0.004)		(0.018)	
OTHERBVE	(0.000)		(0.025)	
NC_OFUND	(0.000)		(0.000)	
NC_BORLEAS	(0.000)		(0.000)	
NC_BONDS	(0.016)		(0.021)	
OTHERPAY	(0.000)		(0.000)	
OFUND	(0.000)		(0.000)	
BORLEAS	(0.000)		(0.000)	
BONDS	(0.000)		(0.000)	
TURNOVER	(0.923)	(0.000)	(0.012)	
GMC	(0.481)	(0.000)	(0.286)	(0.000)
OPNI	(0.000)		(0.000)	
RIF	(0.000)		(0.001)	
NETF	(0.000)		(0.000)	
EBT	(0.000)		(0.000)	

Annex 5

Figure 3 - In-sample forecasting of the final model of individual statements for the period 2007-2016

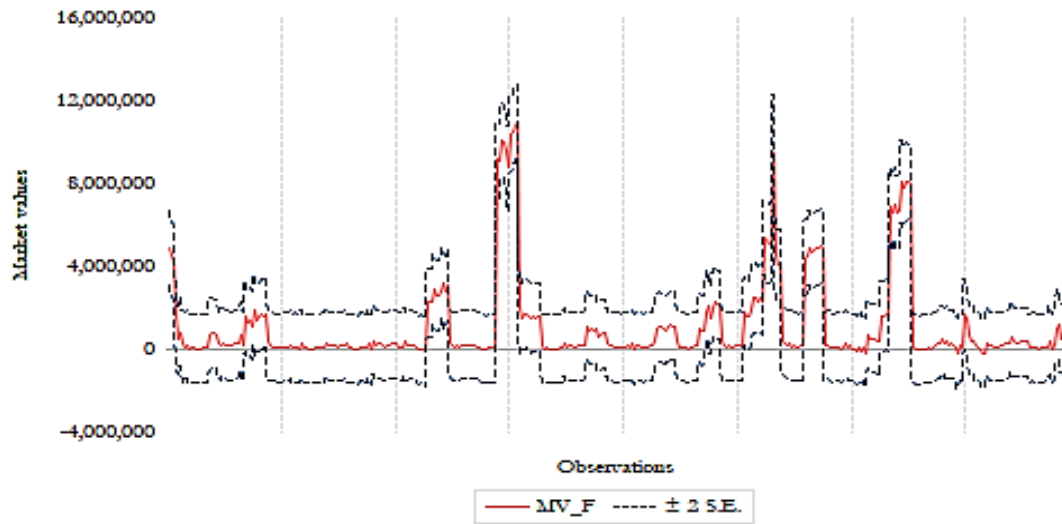


Figure 4 - In-sample forecasting of the final model of consolidated statements for the period 2007-2016

