Recognizing and Disclosing Tax Loss Carryforward under IAS in periods of Financial Crisis

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Abstract
The study extends previous research by examining whether the recognition and disclosure of Deferred Tax Assets for Tax Loss Carryforward (DTA_TLC) under IFRS comply with IAS 12 requirements, especially in times of financial downturn. More specifically, it investigates whether and to what extent the firms' quality of audit, tax disclosure, and specific characteristics affect the recognition of DTA_TLC. The sample comprises the largest firms listed on the Athens Stock Exchange (ASE), covering the period from 2005 to 2012, bracketing the outbreak of the financial crisis. Using a unique, hand-collected panel dataset and a multivariate Logit regression model, I find only partial compliance with the guidelines of IAS 12 in the recognition of DTA_TLC. The quality of tax disclosures and the selection of external auditors other than big auditing firms increase the probability of DTA_TLC recognition, while higher auditor independence and the type of audit report opinion seem to decrease it.
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1. Introduction

Previous studies have shown that accounting standards alone cannot guarantee the reliability of financial reporting (Leuz and Wysocki 2008). A variety of corporate and Industry characteristics, combined with institutional factors, seem to affect the quality of financial information. Management incentives linked to profitability, stock exchange prices, internal and external governance structures, and other institutional characteristics of the economy may prove to have more weight and prevail over accounting rules (Holthausen 2009). Leuz (2006) argues that the degree of ownership concentration (ownership structure) gives rise to systematic differences in earnings management and the total effect of financial information. Ball and Shivakumar (2005) in England and Burgstahler, Hail and Leuz (2006) in the EU find that adopting the same accounting standards alone does not guarantee comparable financial reports, thus highlighting the importance of other institutional characteristics in the process of developing financial information.

The two internationally prevailing accounting standards concerning income tax accounting are Accounting Standard IAS 12 «Income taxes» (IASB 1996) of the International Accounting Standards Board (IASB) and Accounting Standards Codification ASC 740 «Income Taxes» of the U.S. Financial Accounting Standards Board's (FASB) Generally Accepted Accounting Principles (GAAP). Under both standards the net recognized deferred tax assets are expected to be the same, but their approach differs. "While ASC 740 requires the recognition of deferred taxes for the full amount of TLC in a first step and the reduction to the usable part in a second step via the Valuation Allowance (VA), IAS 12 limits the recognition to the usable TLC fraction right from the beginning" (Flagmeier 2017,10).

Disclosures regarding the potential recognition of deferred tax assets from tax losses carryforward (DTA_TLC) comprise significant information that is valued by the markets (value relevance). According to research conducted by the European Financial Reporting Advisory Group (EFRAG 2013b), the projected disclosure of deferred tax in financial reports comprises important information and needs to be further improved. Hanlon and Heitzman (2010) also point out that the field of tax losses brought forward should be further explored to improve the understanding of the value of tax loss carry-forwards, and the impact of losses on the behavior of involved parties. Handling DTA positions in times of economic downturn is considered a priority under the agenda of the European Securities and Markets Authority (ESMA 2019, 2014), as well as

IFRIC 23 "Uncertainty over Income Tax Treatments", which clarifies the process of applying the IAS 12 recognition and measurement requirements, in case of uncertainty over income tax treatments (IASB, 2017).

In response to the need for further research into the factors related to the internal and external business environment affecting DTA_TLC disclosure in times of crisis, the present research uses data from the period 2005-2012, bracketing 2009, the year of the first Greek economic adjustment program, in which the impact of the global financial crisis was recorded in firms' financial statements. For instance, in the period under examination, 2005-2012, the net amount of DTA_TLC on FTSE/ASE-listed non-financial firms was, on average, the second in significance component of DTA, and at the end of 2012, it tripled in comparison to 2005. Meanwhile, 41% of the firms presented DTA_TLC that during the financial years 2005-2012 cover on average 44.6% of the total DTA and 20% of the net pre-tax income (Chytis et al. 2015). I examine the compliance of firms listed on FTSE/ASE with the DTA_TLC recognition criteria of IAS 12, and the relevant information provided. Furthermore, I investigate whether and to what extent determinants of audit report and tax disclosure quality, and firms' specific characteristics and exogenous factors affect the recognition of DTA_TLC.

To the best of my knowledge, this is the first empirical study adopting this approach to investigating the determinants of DTA_TLC recognition in Greece in the industry sector. As the recognition of DTA_TLC in Greece only gained relevance after 2014 with the introduction of the new Greek local GAAP (ELP/Law.4308/2014 in Republic of Greece 2019), firms may continue to understate this item even under international standards. Findings suggest that DTA_TLC are not recognized according to the IAS 12 guidelines , and are not in line with previous results from sample firms that follow the U.S. accounting standards (Behn et al. 1998). Probability of DTA_TLC recognition increases with the quality of disclosures and the selection of an auditing firm other than the big4. By contrast, it seems to be impaired by higher auditor independence and the type of audit opinion. The results of the study are of interest to financial statement setters, capital market users, regulators, supervisors and tax authorities.

This study promotes scientific knowledge and complements the existing literature in several ways. While most existing research uses U.S. accounting data under SFAS 109 (Jeter et al. 2008; Báez-Díaz and Alam 2013; Tsalavoutas et al. 2020), the present study employs a unique hand-collected data set encompassing the annual reports of firms that were the first to follow IAS 12 in 2005, thus extending research to the European business environment. Furthermore, the tax environment in which the sample firms operate in is highly volatile, with insufficient supervisory mechanisms and investor protection (Karampinis and Hevas 2011). The research model includes proxies for measuring the firm's tax disclosure and auditing quality and control variables related to institutional and firm-specific characteristics.

The remainder of this paper is structured as follows: Section 2 provides the theoretical background of the handling of DTA_TLC accounts. Prior research is discussed in section 3. Section 4 develops the hypothesis and the research model, Section 5 describes the related results and section 6 presents the conclusions.

2. Research Background on Accounting for Deferred Tax Assets

The Anglo-Saxon and American accounting thought and practice has been dominated by the need for an inter-period income tax allocation in financial statements (Graham et al. 2012). In 2009, the ASC 740 incorporated accounting standard SFAS 109 ("Accounting for Income Taxes"), which had been introduced in 1992 (SFAB 1992). The implementation of SFAS 109 in the U.S. was accompanied by a loosening of the strict Accounting Research Bulletins (ARB 11) criteria applied on the recognition of DTAs. On the other hand, IAS 12 was issued in 1979, and since then it has been reformatted and amended several times in particular with regard to the value allowance (VA) concept (EFRAG 2013a). Despite a convergence attempt between IAS 12 and ASC 740 that did not finalize due to the negative feedback IASB received from constituents, there are several differences concerning recognition, measurement and disclosure criteria.

With regard to their treatment of tax loss carryforwards (TLC) the two standards are not comparable for the following reasons. First, under ASC 740, deferred tax assets (DTA) and deferred tax liabilities (DTL) must be classified in a consistent manner in accordance with the underlying asset or liability, as either short-term or long-term items. If the deferred tax is unrelated to an asset or liability (e.g., TLC), its classification should be based on the expected reversal of the underlying temporary difference. On the other hand, IFRS IAS 12 requires classification of all deferred taxes as noncurrent. The second major difference between the two standards, regards the recognition of DTAs. ASC 740-10-30-5(e) requires that DTAs of TLC are recognized in full amount

and then, if there is greater likelihood (over 50%) that a part or all of the DTA_TLC will not be realized, they are reduced by a Valuation Allowance (VA) to the sum more likely to be realized. By contrast, under IAS 12, DTAs are only recognized if "it is probable that future taxable profit will be generated against which unused tax losses can be utilized" (IAS 12.34). The unused tax losses for which no deferred tax asset is recognized have to be disclosed (IAS 12.81 (e). Essentially, IAS 12 limits DTA recognition to the usable part of TLC from the beginning, while ASC 740 gets to it after the VA 'writes off' the TLC fraction not expected to be usable, in a two-step approach. Under IAS 12, to generate the same information as the VA (about the non-usable part of TLC), the disclosed unused tax losses have to be multiplied by the applicable tax rate (Flagmeier 2017).

In Greece, entities of the private sector can choose from two financial reporting standards, IFRS and the relatively recently enacted the National Accounting Standards (GR GAAP). Deferred tax, under IAS 12, has been mandatory only in IFRS implementing entities (mainly listed companies), since 01/01/2005, while according to the National Accounting Standards (GR GAAP), which were enacted on 01/01/2015, the use of deferred tax remains an option. The tax legislation that applies is included in the Income Tax Code (L. 4172/2013, Article. 27, para. 1,), which states that, if the result of the tax year is a loss, this loss may be carried forward and be offset against taxable profits of the future five (5) consecutive tax years. The losses of earlier years are offset in priority over subsequent year losses.

3. Literature review

Deferred Tax Assets and Market Perception

A large part of past empirical studies on the recognition of DTAs focuses on whether investors, analysts and financial markets perceive the requirements associated with DTA_TLCs as assets (value relevance). Kirschenheiter et al. (1997) explore the relationship between deferred tax positions (DTPs) and share prices. They find that DTA_TLCs show a negative correlation with the market valuation and conclude that, since investors do not anticipate future income tax benefits, they do not perceive the DTA_TLC as value-added items. Ayers (1998) investigates whether SFAS 109 provides investors with more relevant information compared to the former APB Opinion No.11 (Bevis and Perry 1969), and whether this information is valued by capital markets. He concludes that a separate recognition of DTA/DTL provides better information compared to APB No.11 and it is valued positively.

Amir and Sougiannis (1999) focus on how financial analysts and investors interpret and incorporate information on DTA_TLC in their forecasts for profits and stock prices. Although they find a positive and significant association between DTA_TLC and share prices, they conclude that analysts expect earnings of firms with TLCs to be less persistent. These results are consistent with those of Kirschenheiter et al. (1997). Zeng (2003), using Canadian data, examines whether the market evaluates information for DTA_TLC and finds that DTA_TLCs are positively correlated with share prices and are treated as assets because they reduce future tax payments. Kumar and Visvanathan (2003) examine in the U.S. setting the extent to which investors use ad-hoc news disclosures concerning changes in VA in order to decode management allowances with regard to future profitability. The results show a negative reaction of the markets in the case of forecasting VA revisions reported in financial reports. Bauman and Bauman (2002) introduce the research question of whether the quality of earnings from listed U.S. firms is influenced by the change of VA. The authors conclude that the reassessment of the VA is based on positive signs for stock prices but with a large enough margin of tolerance. Bauman and Das (2004) examine whether deferred taxes affected the share prices of U.S. internet firms before and after the market correction at the beginning of 2000 and show that stock prices are positively correlated with indicator factors of DTAs. Taking into account the different deferred tax components, the analysis of Chludek (2010) shows that investors consider that only large net DTAs convey relevant information for assessing firm value. Meanwhile, DTAs were shown to have a significant positive association with firm market value during the financial crisis of 2007-2008 (Badenhorst and Ferreira 2016).

On the other hand, the negative effect of DTLs/DTAs appears to become more pronounced for loss firms in cases of financial distress (Samara 2014; Hanna et al. 2019). During such crises, an unrestricted TLC and, in particular, an unrestricted loss carryback enhances liquidity, mitigates the risk of bankruptcy and results in a faster recovery of stock prices (Koch et al. 2023). With regard to DTAs, due to DTA_TLC, a significant positive

contribution to the valuation by the stock markets could not be established, as the negatively evaluated information on loss history seems to affect investors and analysts more than the possibility of future tax savings (Kirschenheiter et al. 1997; Amir and Sougiannis 1999; Sarkar 2014).

Deferred Tax accounting and Financial Statements' True and Fair View

Another topic of interest in the literature concerns whether deferred tax accounting is used for earnings management (EM) purposes and is associated with financial misstatement. Miller and Skinner (1998) examine the factors that determine the change of VA based on the assumption that firms with large amounts of DTLs must show less VA. The results verify their hypothesis but do not contain significant evidence that VA is used to roll forward or to strengthen profits. Behn et al. (1998) analyze the factors that determine the size of the forecast reduction of VA of DTAs. The results show that a statistically significant effect on the gross amount of VA is related to the taxable income brought forward. It is also observed that the basic principles of SFAS 109 for the determination of the VA are followed. Visvanathan (1998) focuses on the issue of reassessing DTA and on whether VA is used as a tool for EM. The results do not indicate profit manipulation practices and agree with those of Miller and Skinner (1998). Frank and Rego (2006) focus on three EM incentives: profit objectives, pillow tax and "big bath accounting". They conclude that there is no statistically significant relationship between the change of VA and DTA with the EM incentives mentioned above. The results are in agreement with those of Miller and Skinner (1998) and Visvanathan (1998).

Bauman et al. (2001) examine the extent to which the reassessment of the DTA through the VA is used (a) to avoid losses, (b) to reduce reported profits, (c) for "big bath" accounting or (d) to verify the forecasts conducted by analysts. The researchers propose the additional use of the tax reconciliation statement, because the impact of a change in VA on the results cannot often be determined from the notes of the annual report. Schrand and Wong (2003) raise the question of whether the VA is used at the time of the first application of SFAS 109 "Effective Date" for EM purposes. Their results suggest that banks with high capital adequacy during the first application of SFAS 109 recognize overprovisions regarding VA and are, thus, able to form reserve pillows to use in the future to improve their results by resetting the initially over-recognized VA.

Chao et al. (2004) also investigate whether VA is used for earnings manipulation. The findings show that incentives and proxies for EM (credit rating, benefit programs for executives, political costs) are not statistically significant. Christensen et al. (2008) examine whether VA is used to manipulate net income. The selected U.S. firms display VA account reduction at a rate that accounts for more than 10% of their assets. The authors conclude that the VA is not used in EM practice in the sense of "big bath" accounting, whereby a company's income statement is manipulated to look worse so that future results can seem better.

Herbohn et al. (2010) also consider whether tolerance in the determination of DTA_TLC is used for EM policies. Their findings show that Australian firms whose results before tax differ from the analysts' forecasts show a major change in the rate of DTA_TLC recognition in assets, which causes an increase in profits. Kasipillai and Mahenthiran (2013) and Warsono (2018) observe that deferred taxes are handled as part of EM practices. In general, most recent research (i.e. Bauman and Bowler 2018) has shown that, taking into account the impact of analysts' forecasts, firms that managed their earnings efficiently used discretionary allowances for DTA.

Regarding the usefulness of deferred taxes for predicting future tax paid and future tax expense, there are conflicting findings in the relevant literature. Cheung et al. (1997), and Legoria and Sellers (2005) find that the accuracy of the cash flow forecasting function is enhanced by introducing deferred taxes into the related Lorek and Willinger (1996) models. Foster and Ward (2011), on the other hand, find no consistent statistically significant correlation between the cash flows of the following financial year and the deferred tax expense or the change in DTPs. For Laux (2013), while deferred taxes provide additional information on future tax payments, their exact amount cannot easily be estimated. Dreher et al. (2024) document that the accuracy of performance forecasts is not necessarily improved by accounting information on TLCs and deferred taxes; in fact, it may even be reduced by it. Finally, Doukakis et al. (2012) suggest that past income taxes provide information about firms' future tax position, and firms meet their tax planning policies by using deferred taxation strategies to reduce future tax expenses.

Finally, regarding the effect of corporate governance characteristics on financial reporting related to deferred taxes and determinants of report quality and tax avoidance, there are only few empirical studies.

Bradbury et al. (2006) argue that the participation of institutional investors and other shareholders, outside of the founding family of the firm, is significantly positively correlated with abnormalities in accruals and therefore with a poor quality of financial reporting. Farber (2005) finds a significant negative correlation between phenomena of fraud in financial statements and the percentage of major shareholders. Ali et al. (2007) argue that family businesses, in which there is concentration of shares by major shareholders, show better financial report quality. Chludek and Duc (2011) also examine corporate governance characteristics (ownership structure and executive compensation), as well as financial statement quality and auditors' choice to recognize DTA and suggest further investigation of subjectivity factors to capture their influence on the recognition of DTA. Flagmeier and Mueller (2017) examine whether companies disclose additional information about TLCs when recoverability is more uncertain and find that uncertainty about the usability of tax losses is negatively related to the amount and quality of disclosure. Kasipillai and Mahenthiran (2013) find that Malaysian firms use the revaluation of the net deferred tax to manipulate after-tax (net) income and this is more likely to occur when ownership is more concentrated and the boards of directors are less independent. Kovermann and Velte (2019) and Chytis et al. (2020) also agree that corporate governance mechanisms steer tax avoidance.

4. Research Design

The goal of this study is to explore a) whether the recognition of DTA_TLC complies with the IAS 12 requirements; b) whether the recognition of DTA_TLC are affected by corporate governance attributes; and c) whether other, non-firm specific, factors affect the recognition of DTA_TLC. In this section, I define the methodology and the variables I selected and developed to measure the impact of endogenous and exogenous business factors on the estimation of recoverability of unused tax losses.

While the basic IAS 12 requirements with regard to the recognition of DTA_TLC do serve as the background against which to determine the firms' compliance, they leave significant scope for management to determine the amount of recognized DTAs. Namely, according to IAS 12, "an entity considers the following criteria in assessing the probability that taxable profit will be available against which the unused tax losses can be utilized: (a) whether the entity has sufficient taxable temporary differences relating to the same taxation authority, which will result in taxable amounts against which the unused tax losses or unused tax credits can be utilised before they expire; (b) whether it is probable that the entity will have taxable profits before the unused tax losses or unused tax credits expire; (c) whether the unused tax losses result from identifiable causes which are unlikely to recur; and (d) whether tax planning opportunities […] are available to the entity that will create taxable profit in the period in which the unused tax losses or unused tax credits can be utilised. To the extent that it is not probable that taxable profit will be available against which the unused tax losses or unused tax credits can be utilised, the deferred tax asset is not recognised" (IAS 12.36). "The carrying amount of a deferred tax asset shall be reviewed at the end of each reporting period. An entity shall reduce the carrying amount of a deferred tax asset to the extent that it is no longer probable that sufficient taxable profit will be available to allow the benefit of part or all of that deferred tax asset to be utilized. Any such reduction shall be reversed to the extent that it becomes probable that sufficient taxable profit will be available" (IAS 12.56).

Even though the above-mentioned criteria constitute a fairly objective guideline for assessing the amount of TLC that can be generated, there is still significant scope for management to determine the amount of recognized DTAs, which makes the role of external auditors particularly significant. I, therefore, set up the following variables to determine the factors that impact the recognition of DTA_TLC in accordance with IAS12.

4.1 Determinants of DTA_TLC Recognition: Firm-internal Factors

4.1.1 IAS 12 Requirements

The existence of future taxable temporary differences (TTD) creates deferred tax liabilities and is, therefore, controlled by the variable DTL (deferred tax liabilities). Regarding the assessment of the company's current and future ability to generate taxable profits before the unused tax losses expire, the variables earnings before tax per share (EBT) and market-to-book value (MtBV) are used respectively (Bradbury et al. 2006; Carcello et al.

2006). It is anticipated that all three variables will be positively associated with the probability of future taxable income, thereby enabling firms to recognize DTA_TLC in accordance with IAS12.

However, the existence of losses brought forward, and especially a history of recent losses, is in itself strong evidence that the company may not have future taxable profit. In such a case, the recognition of DTA_TLC requires the presence of additional convincing evidence (IAS 12.35). Paragraph 82 of IAS 12 mandates disclosure of the DTA amount and the evidence supporting its recognition. For this reason, Equation (1) in section 4.3 below includes the variable Loss_History, which is equal to 1 when the firm has sustained losses, either in the current or previous tax period, and equal to 0 in the opposite case. The variable is expected to have a negative correlation with the possibility of recognizing DTA_TLC.

Since information on the causes and the composition of the allowable TLC is not intended to be publicly available, it is difficult to assess whether and to what extent the losses recorded are cyclical. The likelihood that the company presents satisfactory profits in the following years, which will become the equivalent of DTA_TLC, is assessed by the variable Book-Tax Differences (BTD), taking into consideration the quality (durability, cohesion, sustainability) of profits and cash flows. The results of the research conducted by Lev and Nissim (2004) show that the indicator taxable income/book income (TI/BI) predicts the development of profits in a satisfactory way five years before and five after the implementation of the U.S. SFAS 109 and its predictive capacity increases over time. Hanlon (2005) concludes that firms presenting a large difference (in absolute value) between accounting and tax results (BTD) produce less stable earnings. Finally, Mills et al. (2006) conclude that BTDs incorporate information which is used by auditors for risk assessment.

There are a number of empirical approaches in the relevant literature to examining BTD information contents in terms of quality of earnings. Overall, the results are quite consistent in that BTDs contain information about financial accounting earnings quality (Mills and Newberry 2001; Burgstahler and Dichev 1997), while Hanlon (2005) examines the impact of high as opposed to low BTDs on investors' perception of the persistence of earnings. She finds that the investors expect the accrual portion of earnings to be less persistent when firms have high BTDs and consider the reported BTDs a potential red flag.

The variable BTD is also appropriate for reflecting the tax planning strategies (Graham et al. 2012; Hanlon and Heitzman 2010) and the measurement of a company's tax avoidance (Manzon Jr and Plesko 2001), that is, IAS 12.36 criterion 4. The study of Tang and Firth (2011) shows that the part of non-normal BTD is suitable for detecting earnings and tax management, which can be monitored independently. Chen et al. (2012) show that the consistency of BTD, as an indicator of joint profit and tax planning management, is associated with stability of the accounting and taxable income. Taylor and Richardson (2014) use the BTD variable to measure tax avoidance and the ability of a company to reduce the effective tax rate (ETR), by associating it with the variables corporate governance and tax experience of management. The majority of investigations have concluded that firms with a relatively good performance in tax avoidance, usually show large differences (BTD) in accounting - taxable income (Dyreng et al. 2008; Frank et al. 2009; Rego and Wilson 2012).

The present study employs the methodology of Hanlon (2005) whereby the absolute value of BTDs is expressed as a percentage of the total asset. Large divergences between accounting - taxable BTDs indicate a reduced cohesion and sustainability of profits in the future and, therefore, a limited chance of meeting future criteria of DTA_TLC recognition in accordance with IAS 12.36. However, more recent research shows that high BTD values are associated with more effective tax management (Blaylocket al. 2010; Tang and Firth 2011).

4.1.2 Corporate Ownership and Reporting Quality

Countries that rely on dynamic jurisprudence (common law countries) are usually characterized by a wide dispersion (free float) of the listed equity and a high degree of investor protection (Porta et al. 1998). By contrast, countries of the Romano-Germanic family law, which are rather centered on legislative instruments (code law countries), are characterized by greater concentration of shares by a small majority of shareholders, more complex ownership and less effective legal protection of minority shareholders. In many cases, owing to different rights in terms of receiving profits and dividends and voting at general meetings, a relatively small majority, often coming from the founder's family, may control decision-making and management to a large extent.

The next group of variables investigates the association between DTA recognition of TLC, ownership concentration and the quality of tax disclosure and external auditing report. The Variable Block_Fam controls the relationship of concentration or a free float of shares with the recognition or not of DTA_TLC. This variable ranges from 0% to 100% expressing on a case-by-case basis the contribution by each company to one of the FTSE/ASE (20-40-80) indices at fiscal year-end. A higher percentage for a company in one of the indices (FTSE/ASE) suggests greater free float of the shares and, therefore, less influence by major shareholders[1]. Bradbury et al. (2006) argue that the participation of institutional investors and ownership outside of the founding family are significantly and positively correlated with anomalies in premiums and, by extension, with poor quality of financial reporting. Ali et al. (2007) argue that family businesses (in which there is concentration of shares by the main shareholders) show better quality of financial reports. Farber (2005) finds a significantly negative correlation between fraud in financial statements and the percentage of major shareholders.

The variable Discl_IAS12 is expressed as a percentage and corresponds to the number of pages of notes (disclosure) of the company's Annual Financial Report (AFR), which refer to current and deferred taxes (Disclosure IAS 12) in all the pages of notes reported in the balance sheet and earning statements. The obligation of firms for detailed disclosure results from the provisions of IAS 12.79-12.88. According to Peterson (2012), more lengthy references to notes (disclosure) of financial statements reflect the need on the part of the management to explain accounting practices and methods that require special attention or incorporate sufficient complexity (Peterson 2012). This category undoubtedly includes deferred annuity taxation and, in particular, the handling of DTA_TLC recognition (ESMA 2014).

The purpose of using the variable IAS 12_SCORE is to further investigate the quality of disclosures and the fair presentation of information on taxation and postponed taxes in annual financial reports (Jonas and Blanchet 2000; Flagmeier, Müller, 2024). For this purpose, I created an index (Score) with decimal values ranging from 0 to 1. Because of the very brief presentation of taxes in financial statements (IAS 1.54 and IAS 1.82), the standard establishes a comprehensive series of disclosures and notifications (notes) of all the information and data related to income taxes (IAS 12.79- 12.88). The most important of these disclosures pertain to the presentation on a gross and net basis (before set-off) of the components and the fluctuation (changes) of deferred taxes over time (12.81.a), so that the final net items may be clearly reflected in the balance sheet and results. Another group of notifications is related to the amounts and the nature of proof in the event of recognition (IAS 82.a and b) or non-recognition (IAS 12.81.e) of tax losses brought forward and the relationship between the output (revenue) tax and the accounting result, by reconciling actual ETR and nominal tax charges (IAS 12.81.c and IAS 84-86).

In order to establish the reliability and the validity of the index score, I used the expert opinion of certified public accountants from four different auditing firms (Big4, Grant Thornton, SOL, and other houses), and three directors from the Hellenic Capital Market Commission (HCMC). More detailed information is provided in Appendix B.

No provision is made regarding the expected sign of the IAS 12_SCORE variable because, on the one hand, higher-quality information and transparency in financial statements may prevent managers from overestimating their DTA_TLC and, on the other hand, qualitative information on issues of deferred taxes refers to an effective tax management, which is expected to make the most of every available tax benefit.

External auditors play a very important part in the context of corporate governance (Brown et al. 2011; Watts and Zimmerman 1983), yet the quality of the external audit is not directly measurable. Instead, the size of the auditing firm is taken into account (DeAngelo 1981; Lennox 1999ab; DeFond et al.2002; Caramanis and Spathis 2006; Karampinis and Hevas 2011; Gaaya et al. 2019). The effect of the size and experience of the auditing firm on the likelihood of DTA_TLC appearance is tested using the variables Aud_Big4_GT and Aud_SOL. The variable Big4_GT includes the Big4, the four world-class auditing firms (Ernst and Young, Deloitte and Touche, KPMG and PwC) and the international auditing firm Grant Thornton (GT). I decided to include Grant Thornton in the Aud_Big4_GT variable, because it is the 6th largest international accounting and

[1]For example, the participation of the company's shares in index FTSE/ASE20 of 30%, pursuant to the rules of FTSE indices, requires a free float greater than 20% and less than 30%. Similarly, a participation in the index by 75% requires a free float from 50% to 75%.

auditing firm worldwide (Big4 consists the first four ranks), holds 5.26% of the clients' market share in Nasdaq (5th largest)[2], and 10% of Greek listed firms (at the FY 2012).

The analysis of DTA_TLC of Chytis et al. 2016 shows that more than two thirds (2/3) of the total DTA_TLC arise from firms audited by the Big4_GT category, while the shares of the other Greek and international auditing firms are single-digit. In order to examine possible effects of the size and the international experience of firms, the overall quality and independence of the external audit, and the form of the opinion expressed by the auditor, I introduced the following variables to the model: The Greek company SOL is assessed separately, owing to its historical course and the fact that it audited one-third of the financial statements of the financial firm years of the sample. The variables Aud_Big4_GT and Aud_SOL are dichotomous and are assigned the values of 1 or 0, depending on whether the company is controlled by the international auditors Big4 and Grant Thornton or by SOL, respectively.

In addition, according to Chen et al (2007), the frequency of changing auditing firms affects the creation of accruals. In this last case, the variable Aud_Repl is equal to 1 when, in the eight years examined, there is a change of auditing firm from year to year, and 0 in the opposite case. The need for a completely independent external audit on financial statements is widely accepted because it secures, to a very large extent, the interests of investors/shareholders against a potential waste of resources by the management (Brown et al. 2011).

In order to investigate the potential impact of the degree of independence of the external audit, I use the variable Aud_SCORE, which is calculated using criteria related to the category of the auditing firm and the content of the audit. The minimum score is 1 and the maximum score is 10. There are two criteria with the same weight: the first (K1) is used to assess the category of the company carrying out the external audit, with Big4_GT and SOL receiving a score of 3 points, other international audit firms receiving a score of 2 points, and smaller Greek and individual audit firms receiving a score of 1 point. The second criterion (K2) assesses the audit's content and uses the number of auditing firms (1 or 2) or the number of auditors involved in the audit process (1 or 2). Scores may range from 1 to 4. The highest score (4) is awarded when two different auditing firms carry out the audit simultaneously, and the lowest score (1) is awarded when one individually operating auditor carries out the audit.

The assessment of going concern has proven to be one of the most difficult subjects of the audit process and opinion (Ryu and Roh 2007), as included in the audit report (EFRAG 2013b, 2013a; ESMA 2014). The variable Aud_RepOp monitors the type of opinions expressed in audit reports, according to the International Standards on Auditing (ISAs) and may range between 1 and 4.[3]

The next variable, Aud_RepUnQ, monitors the potential significance of extreme values, by assigning 1 to unqualified opinions and 0 to qualified opinions. Several researchers argue that a qualified report is positively associated with the amount of discretionary accruals (Jere and Jagan 1999; Koumanakos et al. 2008), while others express the opposite view (Bradshaw et al. 1999). Butler et al. (2004) did not verify that firms receiving qualified reports tend to manipulate the profits more than those receiving unqualified reports.

Previous research show that, because of their larger size, Big4 auditing firms are more likely to disclose EM practices and may issue qualified reports, compared to non-Big4 firms (M. DeFond et al. 2002; M. L. DeFond et al. 1999). In addition, the non-Big4 firms may issue a qualified opinion owing to a lack of adequate resources and expertise in detecting errors and irregularities (Craswell et al. 2002). On the other hand, other studies show that the size of the auditing firm does not affect the tendency of auditors to issue a qualified opinion (Bartov et al. 2000; Caramanis and Spathis 2006; Chan et al. 2006). For the above reasons, I cannot predict the expected sign of these variables.

4.2 External Environment and Control Variables

In the context of the model, the variable IR (interest rate) represents the influence of the external environment and refers to the average cost of business financing for the period 2005-2012. The borrowing interest rate used is the average annual rate of 10-year titles as reported by the Bank of Greece. The variable TR (tax rate) is used to

[2] Data from Audit analytics (report 2022, p.8),
https://www.auditanalytics.com/doc/AA_Audit_Firm_Market_Share_Report2022.pdf

[3] Opinions under type 1 correspond to assent unqualified opinion (clean report) and the remaining categories 2-4 (Qualified opinion, Disclaimer of opinion and Adverse opinion) are broadly characterized as qualified opinion.

express the nominal tax rate under Law 2238/1994, as applicable each financial year. The change in tax rates gives rise to a reassessment of DTPs and, consequently, of DTA_TLC (see IAS 12.58-60).

In order to control for the potential influence of specific firm-size characteristics, the variables natural logarithm of assets (lnMV) and financial leverage (lev) are employed. The Industry Classification Benchmark, as defined by the Athens Stock Exchange (ICB_ASE), is used to gauge the influence of sector-specific characteristics on an annual basis. The participation (value 1) or non-participation (value 0) of firms in one of the financial FTSE-ASE indices allows for the examination of specific characteristics of firms' market capitalization and stock performance. Table 1 depicts the variable definitions and the expected sign.

Table 1 Variable Definitions and expected sign

Variable	Definition	Expected Sign
IAS 12 Recognition		
DTA_TLC	Dummy variable: 1 if firm reported DTA_TLCs at fiscal year-end, 0 otherwise	
Δ_DTA_TLC	Dummy variable: 1 if a change (+/-) of DTA_TLC from year to year (t-1 to t) of a firm reporting DTAs for tax loss, 0 otherwise	
DTL	Deferred tax Liabilities per share at fiscal year-end (hand-collected)	(+)
EBT	Earnings Before Tax per share of a firm at fiscal year-end	(+)
MtBV	Market / Book Value	(+)
Loss_History	Dummy variable: 1 if the firm reported a loss in the current or previous years, 0 otherwise	(-)
BTD	The absolute value of the Difference between Book – Tax profits (BTD), (%) of the total assets (calculated using hand-collected data)	(+)
Corp. Structure - Report. Quality		
Block_Fam	Content degree of concentration of firm's shares by the main shareholders at fiscal year- end -ranges from 0% to 100 % (calculated using shares free float and rules of the company's shares in index FTSE/ASE participation)	(?)
Discl_IAS12	IAS12 disclosure report quality-expressed as (%) the number of pages of notes of the Annual Report, which refer to Taxes	(+)
IAS 12_SCORE	IAS12 disclosure compliance score - The rating scale is from 1 (full) to 6 (poor).	(?)
Aud_Big4_GT	Dummy variable: 1 if company is audited by Big4 (Deloitte, Ernst & Young, KPMG, PWC) and Grant Thornton, 0 otherwise	(?)
Aud_SOL	Dummy variable: 1 if the firm is audited by SOL SE (biggest Greek audit firm), 0 otherwise	(?)
Aud_Replit	Dummy variable: 1 if during the sample period the auditing firm is replaced, 0 otherwise	(?)
Aud_SCORE	Score content degree of external audit independence - Minimum score is equal to 1 and maximum score is	(?)

	equal to 10	
Aud_RepOp	Monitors the types of opinions expressed in audit reports (values from 1 to 5)	(?)
Aud_RepUnQ	Dummy variable: 1 if the audit report opinion is unqualified, and 0 if qualified	(?)
External Environment		
IR	The average cost of a firm's borrowing as (%) during the sample period	
TR	The nominal tax rates (%)- at fiscal year-end	
Control Variables		
LnMV	Natural logarithm of total assets	
Lev	Debt / Total Assets	
ICB_ASE	The firm's Industry Classification Benchmark- at fiscal year-end	
FTSE_ASE	Dummy variable: 1 if firm - at fiscal year-end- is included in the stock index FTSE ASE20, or FTSE/ASE40 or FTSE/ASE 80, 0 otherwise	

4.3 Regression Model and Sample Selection

This study investigates whether the recognition of DTA_TLC complies with the IAS 12 requirements, and the recognition and magnitude of DTA_TLC are affected by corporate governance attributes and other exogenous factors. Since the standards do not set objective criteria, the estimation of recoverability of unused tax losses is influenced by the management assumptions and intentions, which means that the firm's top management and auditors determine the amount of unused TLC.

For the above-mentioned reasons, research model (1) incorporates variables referring to Compliance with IAS 12 (IAS12-Criteria), ownership Corporate Structure (CS), Quality and Reliability of Financial Reporting (RQ), the effect of institutional factors related to the External Environment of firms (EE), as well as a range of Control Variables (CV).

$$DTA\_TLC_{it} = \beta_0 + \sum\beta * IAS12\_Criteria + \sum\beta * CS + \sum\beta * RQ + \sum\beta * EE + \sum\beta * CV + e_{it}$$ Model (1)

The dependent (dichotomous) variable (DTA_TLCit), indicates the probability of recognition (value = 1) or nonrecognition (value=0) of a DTA_TLC in the company's (i) balance sheet in period (t).

Equation 1: Recognition of Deferred Tax Asset from Tax Losses Carry Forward

$$\begin{aligned} DTA\_TLC_{it} = (&\beta_0 + \beta_1 * DTL_{it} + \beta_2 * EBT_{it} + \beta_3 * MtBV_{it} + \beta_4 * Loss\_History_{it} + \beta_5 * BTD_{it} \\ &+ \beta_6 * Block\_Fam_{it} + \beta_7 * Discl\_IAS12_{it} + \beta_8 * IAS12\_SCORE\_it \\ &+ \beta_9 * Aud\_Big4\_GT_{it} + \beta_{10} * Aud\_SOL_{it} + \beta_{11} * Aud\_Repl_{it} \\ &+ \beta_{12} * Aud\_SCORE_{it} + \beta_{13} * Aud\_RepOp_{it} + \beta_{14} * Aud\_RepUnQ_{it} \\ &+ \beta_{15} * IR_{it} + \beta_{16} * TR_{it} + \beta_{17} * lnMV + \beta_{18} * lev + \beta_{19} * ICB\text{-}ASE_{it} \\ &+ \beta_{20} * FTSE\text{-}ASE_{it}) + e_{it} \end{aligned} \quad (1)$$

4.3.1 Sample and Data

The research sample comprises all firms listed in the Athens Stock Exchange (ASE), which, during the period 2005-2012, were included in the internationally certified indices FTSE/ASE 20, FTSE/ASE Mid 40 and FTSE/ASE 80. In this period, there is full and mandatory application of International Financial Reporting standards (IFRS). Financial firms are excluded from the research model because their financial statement and reporting may be affected by the specific government measures they face, which differentiates them from the other firms of the sample (Halioui et al. 2016), especially in 2011, when the Greek debt was restructured with the involvement of the private sector (PSI). Bank losses from the Greek debt restructuring were estimated on average at 78% of the face value of the old Greek government bonds (GGBs). For the Greek banking sector, these losses (TLC) amounted to EUR 7.7 billion (Bank of Greece 2012). According to the IAS 12 guidelines and criteria, a DTA_TLC shall be recognized for these unused tax losses.

Table 2 Sample overview

Sample period (Years)	Prime Standard	Excluded Banks	Missing data	Total
2005	130	-11	-4	115
2006	130	-11	-4	115
2007	130	-11	-4	115
2008	130	-11	-4	115
2009	130	-11	-4	115
2010	130	-11	-5	114
2011	130	-5	-11	114
2012	130	-3	-17	110
Firm-Years	1040	-74	-53	913

This table presents the sample distribution by year

In accordance with IAS 1 “Presentation of Financial Statements”, the information concerning income taxes (current and deferred) is limited to their net value (line items, DTA/DTL and tax expense). For this reason, IAS 12 mandates detailed information to be disclosed (notes) (IAS 12.79 - 12.88) along with annual and periodic reports. I found that none of the certified machine-readable databases include information that would allow for a stable long-term detailed analysis of the rise, composition, source and changes in deferred tax positions. To overcome the above limitations, data were hand-collected from the Consolidated Annual Reports and classified as a panel.

Table 2 illustrates the distribution of the sample on an annual basis. The distribution of observations (firm years) and cumulative DTA per sector, illustrated in Appendix A, shows the distribution of deferred taxes arising from unused TLCs by sector (ASE-ICB Code).

5 Results

5.1 Descriptive Statistics

Table 3 presents the descriptive statistics of the variables employed. The variables used in the analysis of DTA_TLC recognition show that firms that recognize DTA_TLC constitute 41% of total firms. The average DTL per share (mean) amounts to EUR 0.24, while earnings before tax per share (EBT) amount to 0.20. The capitalization of firms in ASE is 2.37 times greater than their equity (MtBV), and 32.7% of financial years show a loss history. The deviation of book-taxable results per unit of assets amounts to EUR 0.020. On average, the involvement of the shares of the firms in the FTSE-ASE indices is approximately 33.3%, which, according to the FTSE-ASE regulation, corresponds to a moderately calculated free float ranging between 20% and 30%

(Block_Fam). The percentage of note pages in the annual report with reference to accounting for income taxes (IAS 12) amounts to 12.4%. The scoring of completeness and quality of notifications (IAS 12_SCORE) is 0.81, with the highest value being 1. 41.84% of firm-years were audited by the big international auditing firms (Aud_Big4_GT), 32.74% by SOL (Aud_SOL), and the remainder by other auditing firms.
Scoring with regard to the composition and independence of external audit (Aud_SCORE) amounts to 4.6, 10 being the highest score. The category of the opinion issued by the certified auditor (Aud_RepOp) is close to 1 (1.29), which refers to the majority of type 1 certificates ´with assent´. The variable Aud_RepUnQ, i.e. the total number of cases in which a certificate ´with assent´ is issued, amounts to 72%. The average lending IR stands at 8.63%, and the average nominal tax rate (TR) at 25%. The average leverage of the company (lev) is 0.573001.

Table 3 Descriptive statistics

Variables	Mean	Median	Max.	Min.	Std. Dev.	Skewness	Kurtosis	Jarque-Bera	Obs.
DTAs_TLC	0.410734	0.000000	1.000000	0.000000	0.492237	0.362895	1.131693	152.8264	913
DTL	0.244929	0.090000	4.540000	-0.010000	0.457495	4.228357	27.52231	25596.71	913
EBT	0.200394	0.130000	7.260000	-3.069.000	1.469153	-1064021	221.2347	1829015.	913
MtBV	2.374162	0.710000	587.1300	-1.440.000	21.48167	23.89054	621.6145	14644784	913
Loss_History	0.327492	0.000000	1.000000	0.000000	0.469556	0.735175	1.540482	163.2794	913
BTD	0.020441	0.012000	0.396000	0.000000	0.030787	4.644061	37.90855	49639.67	913
Block_Fam	0.333297	0.300000	1.000000	0.000000	0.292744	0.473750	2.338234	50.81186	913
Discl_IAS12	0.123980	0.111100	0.666700	0.025000	0.063791	2.265492	15.67520	6855.045	908
IAS 12_SCORE	0.814348	1.000000	1.000000	0.000000	0.283930	-1.229.143	3.147067	230.7151	913
Aud_Big4_GT	0.418401	0.000000	1.000000	0.000000	0.493567	0.330832	1.109450	152.6224	913
Aud_SOL	0.327492	0.000000	1.000000	0.000000	0.469556	0.735175	1.540482	163.2794	913
Aud_Replit	0.113910	0.000000	1.000000	0.000000	0.317876	2.430514	6.907400	1479.721	913
Aud_SCORE	4.674699	5.000000	10.00000	0.000000	1.310545	0.849576	7.733350	962.1392	913
Aud_RepOpit	1.290429	1.000000	5.000000	1.000000	0.504743	1.989609	9.966723	2437.991	909
Aud_RepUnQit	0.721796	1.000000	1.000000	0.000000	0.448360	-0.989909	1.979921	188.6960	913
IRit	8.637251	4.800000	22.81000	3.590000	6.476920	1.247686	3.075015	237.0952	913
TRit	0.250285	0.250000	0.320000	0.200000	0.038063	0.346893	2.323121	35.74030	913
lnMV	8.307831	8.260000	10.22000	7.060000	0.676104	0.515142	2.709864	43.58297	913
lev	0.573001	0.580000	2.300000	0.050000	0.199687	0.804427	9.656819	1784.217	913

This table presents the descriptive statistic for the sample.
See table 1 for variable definitions.

5.2 Empirical Results

Table 4 gives an overview of the results of the Logit regression[4] (Equation 1). The dependent variable is DTA_TLC; the dummy variable is 1 if the company reported DTAs for a tax loss and tax credit carryforwards at fiscal year-end, and 0 otherwise. The method used is ML - Binary Logit (Quadratic hill climbing).

Table 4 Regression results: *Dependent Variable: DTA_TLC (ML - Binary Logit -Quadratic hill climbing)*

Variables	**Expected Sign**	**Coefficient (z-Statistic)**
IAS12 Recognition		
DTL	**(+)**	**-0.435424****
		(-2.216909)
EBT	(+)	-0.137226
		(-1.492402)
MtBV	**(+)**	**-0.104630****
		(-2.146867)
Loss_History	**(-)**	**1.431694 *** **
		(6.829134)
BTD	**(+)**	**10.17637*****
		(3.145555)
Corp. Structure - Rep. Quality		
Block_Fam	(?)	0.133737
		(0.273025)
Discl_IAS12	(+)	2.047742
		(1.532362)
IAS 12_SCORE	**(?)**	**2.145619*****
		(6.264316)
Aud_Big4_GT	(?)	0.125593
		(0.284177)
Aud_SOL	**(?)**	**1.403834*****
		(3.260687)
Aud_Replit	(?)	-0.143486
		(-0.538310)
Aud_SCORE	**(?)**	**-0.354335****
		(-2.222777)
Aud_RepOp	**(?)**	**-2.838992*****
		(-2.572937)
Aud_RepUnQ	(?)	-1.957931
		(-1.753465)

[4] According to the literature, when conducting research based on data from the accounting field, and particularly in cases of small and choice-based samples, it is appropriate to use the logit regression, rather than the OLS (Maddala 1991; Peterson 2012; Birt et al. 2013).

External Environment	
IR	-0.016296
	(-0.740901)
TR	2.729648
	(0.707085)
Control Variables	
lnMV	**1.394309*** **
	(7.701560)
Lev	**1.322900*** **
	(2.792409)
ICB-ASE	4.58E-05
	(1.366082)
FTSE	-0.024771
	(-0.084480)
C	-9.745713
	(-3.404387)

McFadden R-squared	0.235288	Mean dependent var	0.410793
S.D. dependent var	0.492249	S.E. of regression	0.417551
Akaike info criterion	1.081898	Sum squared resid	154.6477
Schwarz criterion	1.193172	Log likelihood	-470.1819
Hannan-Quinn criter.	1.124388	Deviance	940.3638
Restr. deviance	1229.697	Restr. Log likelihood	-614.8484
LR statistic	289.3331	Avg. Log likelihood	-0.517821
Prob (LR statistic)	0.000000		
Obs. with Dep=0	533	Total obs.	908
Obs. with Dep=1	373		

Regression results (equation 1).
Variable definitions are found in Table 1. *, **, *** indicate statistical significance at 0.10, 0.05, and 0.01 levels, respectively.

It is not easy to determine compliance with the IAS 12 criteria, in order to allow for the recognition / de-recognition of DTA_TLC. The variable DTL, which quantifies the adequate deferred tax liabilities for prospective offset against DTA_TLC, is statistically significant at the 5% level, yet it demonstrates a contradictory effect (significance).Variable EBT is not statistically significant and takes an opposite sign than expected. This may be due to the emergence of a high number of negative earnings before tax per share (EBT), especially after 2009, because of the economic recession.

Similarly, although variables MtBV and Loss_History are statistically significant at 5% and 1% respectively, I did not confirm the assumption that firms with an expected market growth are positively associated with the likelihood of future taxable profits, while firms with a history of recent losses are not (Bradbury et al. 2006; Carcello et al. 2006). The behavior of MtBV may be attributed to the fact that the estimates of accountants and auditors on the financial statements regarding growth and future profitability (book value) are not in line with those of the market (market value). Loss_History does not appear to prevent firms from displaying or maintaining in their balance sheet deferred tax claims from losses brought forward. This can be due to better inside information that the management has regarding the nature of these losses and the possibility that they may be repeated.

The difference of book-taxable profits is highly significant, as in previous studies, and it appears to be appropriate for measuring the quality of future profitability (Hanlon 2005; Lev and Nissim 2004) and for tax planning within the company (Dyreng et al. 2008; Frank and Rego 2006; Rego and Wilson 2012).

I find no systematic relation between DTA_TLC recognition and firms' characteristics related to the degree of capital concentration of the firm's shares (Block_Fam) and the tax disclosure score (Discl_IAS12). The quality of IAS12 tax disclosure (IAS 12_SCORE), is highly statistically significant and shows the expected sign. This leads to the conclusion that firms recognizing DTA_TLC disclose better-quality information on accounting for income tax. These findings are consistent with those of Peterson (2012).

Regarding the impact of the size end experience of the auditing firm, selecting the audit firm Aud_SOL (highly significant) instead of Aud_Big4_GT (non-significant) appears to differentiate the result, which indicates that firms audited by the Aud_Big4_GT are less likely to recognize claims from deferred taxes compared to those controlled by Aud_SOL. This perhaps confirms the view of M. DeFond et al. (2002) and M. L. DeFond et al. (1999) that larger auditing firms may be, and indeed often are, stricter concerning the compliance of firms with the requirements of accounting standards. In contrast, the replacement of the auditing company (Aud_Replit) shows a negative sign (Chen et al. 2007) but no statistical significance.

Concerning the composition of the external audit (Aud_SCORE), I find that it prevents the recognition of DTA_TLC and is statistically significant at 5 percent. An external audit with theoretically greater independence (two different auditors from the same or different audit firm) effectively seems to reduce the likelihood of DTA_TLC.

Finally, concerning whether the type of audit report opinions (variable Aud_RepOp) or a qualified audit report (Aud_RepUnQ) relates to the possibility of recognizing DTA_TLC, the results show that both variables have a negative correlation, with the first being more significant. The sign of the variable Aud_RepUnQ indicates that the granting of a qualified audit report is positively related to the recognition of DTA_TLC. The result is in line with previous findings, whereby a qualified report is positively associated with the sum of discretionary accruals (Jere and Jagan 1999; Koumanakos et al. 2008).

The effect of the external environment, in terms of average cost of borrowing (IR) and nominal tax rates (TR) for the period 2005-2012, does not seem to be statistically significant. In contrast, the size and the leverage of the company (variables lnMV and lev) are demonstrated to have a positive effect on DTA_TLC and are statistically significant at 1 percent. Finally, the variables measuring sectoral (ICB-ASE) and stock index impact (FTSE-ASE) do not appear to be statistically significant.

5.3 Supplemental test

To check whether the regression results are robust to different variable definitions, model specifications, and estimation methods, I perform several robustness tests with largely unchanged results. First, results are qualitatively unchanged using the variable TR (nominal tax rate) instead of cash tax rate and FTSE-ASE 20, 40, 80 indices separately instead of the dummy variable FTSE-ASE. Second, the results are not specific to industry (ICB-ASE) and or Stock Market Index (FTSE-ASE), although the average amount of DTAs is quite heterogeneous across industry indices. Additionally, I test sensitivity regarding the dependent variable. Instead of the variable DTA_TLC, the variable Δ_DTA_TLC is used. This variable receives a value of (1) if it changes with every increase or decrease in DTAs from Tax Losses carried forward from year to year (t-1 to t), and a value of (0) otherwise. In both regressions, the signs of the estimated coefficients remain consistent. In the sensitivity test regression (with the dependent variable Δ_DTA_TLC), variables DTL and MtBV are no longer statistically significant, while variables EBT and ICB-ASE become significant at the 10% and 5% levels, respectively. The variable Aud_SCORE is now statistically significant at the 1% level (previously significant at the 5% level in the first regression).

Table 5 Regressions Results: Dependent variable DTA_TLC versus Δ_DTA_TLC (Method: ML - Binary Logit -Quadratic hill climbing)

Variable	Predicted sign	Coefficient (z statistic)	Coefficient (z statistic)
IAS12 Recognition			
DTL	**(+)**	**-0.435424****	*-0.226800*
		(-2.216909)	(-1.171825)
EBT	(+)	-0.137226	-0.156613
		(-1.492402)	(-1.638258)
MtBV	(+)	**-0.104630****	*-0.034003*
		(-2.146867)	(-1.066673)
Loss_History	(-)	**1.431694*****	**1.458883*****
		(6.829134)	(6.908706)
BTD	(+)	**10.17637*****	**10.75528*****
		(3.145555)	(3.267444)
Corp. Structure - Report Quality			
Block_Fam	(?)	0.133737	0.237845
		(0.273025)	(0.49214)
Discl_IAS12	(+)	2.047742	1.080084
		(1.532362)	(0.802149)
IAS 12_SCORE	(?)	**2.145619*****	**2.221282*****
		(6.264316)	(6.577847)
Aud_Big4_GT	(?)	0.125593	0.250810
		(0.284177)	(0.572794)
Aud_SOL	(?)	1**.403834*****	**1.472246******
		(3.260687)	(3.450152)
Aud_Replit	(?)	-0.143486	-0.080470
		(-0.538310)	(-0.306714)
Aud_SCORE	(?)	**-0.354335****	**-0.424795******
		(-2.222777)	(-2.683692)
Aud_RepOp	(?)	**-2.838992*****	**-3.082099******
		(-2.572937)	(-2.649359)
Aud_RepUnQ	(?)	-1.957931	-2.142720
		(-1.753465)	(-1.823369)
External Environment			
IR		-0.016296	-0.012116
		(-0.740901)	(-0.552689)
TR		2.729648	4.209537
		(0.707085)	(1.103419)
Control Variables			
LnMV		**1.394309*****	**1.400229******

	(7.70156)	(7.702479)
Lev	**1.322900*** **	**1.254997**** **
	(2.792409)	(2.677430)
ICB-ASE	4.58E-05	**7.16E-05** **
	(1.366082)	(2.139962)
FTSE-ASE	-0.024771	-0.073307
	(-0.084480)	(-0.252110)
C	-9.745713	-9.533246
	(-3.404387)	(-3.252304)

A comparison of the results of regressions 1 and 2.
Variable definitions are found in Table 1. *, **, *** Indicate statistical significance at 0.10, 0.05, and 0.01 levels, respectively.

Finally, regression results (Table 5) are similar to the results of the Logit estimation applying the OLS model or the Random effect GLS regression (panel data) instead.

6 Conclusions

The present is an exploratory research that investigates whether the recognition, measurement and disclosure of DTAs arising from DTA_TLC in IFRS financial statements comply with IAS 12 requirements. Using hand-collected data from non-financial listed firms over the period 2005–2012, it is found that the recognition of DTA_TLC does not fully comply with the IAS 12 criteria, in contrast to previous research findings from firms following the U.S. SFAS 109 (Behn et al. 1998). Concerning the impact of firms' specific characteristics and determinants of audit and tax disclosure quality on the recognition of DTA_TLC, especially during a financial crisis, it is found that the quality of tax disclosures and the selection of a local auditing firm other than the international big houses increase the probability of DTA_TLC recognition. In contrast, higher auditor independence and the type of audit report opinion seem to decrease it.

The research contributes to the existing literature in the field of Accounting for Income Taxes and especially tax loss carryforward under IAS 12 in the following ways. While most existing research employs U.S. data based on SFAS 109, the present study focuses on the European business environment, in which the IAS 12 has been mandatory for all EU-listed companies since 2005. Furthermore, the study examines firms that operate in a volatile taxation and economic environment (the period surrounding the Greek 2009 financial crisis and the first economic adjustment program), with insufficient supervisory mechanisms and a low level of investor protection.

The findings on the relationship between the recognition of DTA_TLC and the effect of corporate and exogenous firm characteristics should be of interest for financial statement setters and users, capital market regulators and supervisors and tax practitioners. The results can also be useful in order to form predictions about a firm's future tax payments and earnings, detect a firm's tax strategy and improve tax administration efficiency, particularly in periods of economic downturn.

The present study has some limitations. First, it focuses on a sample of Greek listed firms. The results could be validated by further research conducted in other European countries with similar corporate tax and governance systems, which could enhance the robustness of the results. Second, additional measures related to the valuation allowances of DTA_TLC could be used to identify sectoral and non-sectoral features related to taxable income and earnings quality.

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APPENDIX A

Distribution of Deferred Taxes arising from unused Tax Losses Carried Forward by Sector

The highest average amounts appear in the telecommunications industry (20.6 mill.) and the lowest in the chemical industry (0.48 mill.). Most financial years with DTA are in the industry of telecommunications (100%), followed by the sectors of raw materials (75%) and healthcare (74%).

In euro	Firm- years without DTA_TLC	Firm -years with DTA_TLC	(%) Firm years	Total DTA_TLC	(%) of total DTA_TLC	Average	St. dev.	Min	Median	Max
Real Estate	10	12	55%	28.061.000	1%	2.338.417	1.433.993	23.000	2.032.000	4.704.000
Insurance	4	3	43%	1.556.000	0%	518.667	418.729	37.000	723.000	796.000
Industrial Goods & Services	85	29	25%	181.398.366	9%	6.255.116	7.170.526	191.911	1.122.237	22.222.511
Retail	18	19	51%	23.436.198	1%	1.233.484	1.631.470	56.754	511.000	5.902.227
Construction & Materials	39	57	59%	574.944.488	30%	10.086.745	20.941.773	3.677	1.600.000	91.515.000
Media	18	14	44%	73.339.618	4%	5.238.544	3.276.957	1.859.773	4.140.306	13.744.285
Oil & Gas	12	9	43%	70.197.633	4%	8.618.269	16.840.948	122.044	390.383	46.416.000
Personal & Household Goods	69	18	21%	26.602.035	1%	1.477.891	1.516.646	255.070	864.362	5.280.000
Basic Resources	14	42	75%	184.712.793	10%	4.397.924	4.999.626	4.256	2.895.248	17.348.364
Travel & Leisure	19	10	34%	32.538.080	2%	3.253.808	2.098.238	244.150	2.975.500	8.033.000
Technology	37	38	51%	197.838.430	10%	5.206.274	7.306.237	1.000	460.000	28.631.476
Telecommunications	0	7	100%	144.100.000	7%	20.585.714	9.503.233	8.600.000	20.900.000	36.000.000
Food & Beverage	58	33	36%	198.610.896	10%	6.018.512	10.797.122	2.005	847.615	38.100.000
Health Care	7	20	74%	32.436.000	2%	1.621.800	2.692.413	37.000	865.500	12.481.000
Utilities	20	8	29%	93.589.000	5%	11.698.625	30.133.974	25.000	89.000	86.040.000
Chemicals	25	10	29%	4.790.356	0%	479.036	329.213	151.860	379.530	1.086.226
Financial Services	21	12	36%	69.182.575	4%	5.765.215	8.408.367	301.000	2.823.080	30.983.000
Total	457	341	43%	1.937.333.468	100%	5.681.330	11.822.099	1.000	1.371.744	91.515.000

APPENDIX B

Disclosure Score

The purpose of the first index criterion (C1) is to measure whether the percentage of disclosures, based on note pages, is higher than or at least equal to the standard deviation of the variable Discl_IAS12 (value = 1). Otherwise (value = 0), it corresponds to information of higher quality. The second criterion (C2) assesses (a) whether the sources and amounts (before clearing) of deferred tax claims (DTAs) and deferred tax liabilities (DTLs) are analyzed in the notes; and (b) whether they agree with the items displayed in the balance sheet. The rating scale is from 1 (full compliance) to 6 (poor compliance). For firms with compliance ranging from 1 (full compliance) to 3 (marginal compliance), the variable C2 is equal to 1, and for scores ranging from 4 to 6, C2 is equal to 0. The proper display of reconciliation between nominal and actual tax rate (IAS 12.81.c) is measured by the criterion C3. If there is agreement or disagreement < 5% between the total cost of the tax status of the profit and loss account (P&L) then the value of C3 is equal to 1; otherwise the variable C3 is equal to 0.

The weighting factors of the criteria (see Birt et al. 2013) were set as follows: for criterion C1 = 20 %, for C2= 30% and for C3 = 50 %. The lowest score in decimal scale is 0.00 and the highest is 1.00.