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Do taxes affect firms' asset write-downs?

Evidence from discretionary write-downs of equity investments in Italy*

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Abstract

If assets write-downs are tax-deductible from the corporate income tax base, companies could discretionally use them to reduce their tax burden. This paper aims at investigating whether and to what extent taxes affect the firm's discretionary choice to write-down long term equity investments. The analysis is based on panel data for Italian companies. In the period 1998–2006 the Italian corporate income tax was reformed several times. In particular, the tax deductibility of write-downs of equity investment was repealed in 2004. The paper exploits the ensuing high cross-sectional and time-series variation in the marginal tax rate (measured before the decision to write-down equity investments) in order to identify tax effects. The econometric analysis delivers strong evidence that taxes affect the decision to write-down. The paper also provides evidence of an interaction between tax minimization, financial reporting costs and agency costs.

Keywords: corporate taxation, asset impairments, write-downs of equity investments, tax planning, financial reporting, agency relationship

JEL classification: H25, H32, K34, M41

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1 Introduction

The literature has long recognized that asset write-downs[1] differ from most financial statement information due to the greater discretion regarding their magnitude and timing (Elliott and Shaw, 1988) and has provided consistent evidence of the strategic use of asset write-downs to manipulate financial statements. Quite surprisingly, the same literature has rather neglected the role of taxes in influencing write-downs decisions. To the extent that write-downs are tax deductible, they can be used to reduce the tax burden of a firm. It is therefore interesting to understand the extent to which taxes affect the discretionary choice to write-down firm's assets and to verify whether there is a trade-off between tax minimization and other organizational goals. The answers to these questions may contribute to a better understanding of the coordination of taxes and other factors in business decisions (Shackelford and Shevlin, 2001, Hanlon and Heitzman, 2010).

Long term equity investment is a natural candidate to investigate the role of taxes in write-down decisions. In the case of a depreciable asset a write-down brings about a temporary reduction in taxable income, as it reduces future depreciation allowances. The effective tax burden, measured by the present value of present and future taxes, is only reduced by the higher discount of future tax payments. In contrast, an investment write-down entails a permanent reduction in taxable income: the incentive to manipulate impairment reporting in order to decrease the tax burden is therefore stronger.

The empirical analysis is based on panel data for Italian companies in the period 1998–2006. There are at least two main reasons for this choice. The first one is that during this period the Italian corporate income tax has been reformed several times. The paper exploits the ensuing variation in the statutory tax rate and tax base in order to generate, using the Graham–Shevlin methodology (Graham, 1996a, 1996b, 1999; Shevlin, 1990), simulated marginal tax rates (MTR), which display considerable cross-sectional and time-series variation. The second one is that the tax deductibility of

[1] We use the term "write-down" to refer to both write-off and partial downward revaluations of equity investments. As explained in section 3 in the Italian framework write-downs and write-offs have the same accounting and tax treatment.

investment write-downs was repealed in 2004; this provides an ideal setting for testing the effect of taxes on financial reporting. We focus on impairments of long term equity investments recorded among financial assets and evaluated with equity-method or cost-method, which likely include more discretion, leaving out mark-to-market adjustments and impairments of available-for-sale securities[2], which include significantly less discretion.

The paper contributes to the existing literature in several respects. First, to the best of our knowledge, this is the first paper that provides direct evidence of tax effects in write-down decisions. Several papers have investigated the empirical determinants of asset write-downs but none of them have considered the *MTR* among the explanatory variables. The econometric analysis delivers strong evidence that taxes affect the decision to writing-down equity investments and provides an estimate of the impact of a tax change on the probability and magnitude of write downs. Furthermore, the paper tests for the existence of a trade-off between fiscal benefits and non-tax costs (such as financial reporting costs and agency costs) in the discretionary decision to write-down. Third, this research jointly analyses the impact of financial reporting costs and the presence of agency relationships on companies' accounting choices, overcoming the traditional dichotomy of the trade-off literature, divided into papers that address the interaction of financial reporting and tax factors and papers that examine the effects of agency costs on tax-minimization strategies (Shackelford and Shevlin, 2001).

The remainder of this paper is organized as follows. Section 2 offers a critical review of the relevant literature. Section 3 provides background information briefly describing the accounting and tax treatment of investment write-downs in Italy. Section 4 describes the calculation of the marginal tax rates. Section 5 discusses the model specification and defines the variables used in the analysis whereas section 6 describes the data sources and summary statistics. The estimations and the results are discussed in section 7. The final section provides some concluding remarks.

[2] We have no data on mark-to-market adjustment and impairments of available-for-sales securities.

2 Literature review

There are two lines of research that are relevant to this study: the write-down literature and the empirical tax research in accounting. The write-down literature investigates the factors that could influence the decision to write-down assets.

All entities, regardless of size, are subject to the risks and uncertainties of economic and technological changes. Rapid technological advances, intense domestic and global competition, volatile interest and foreign exchange rates and rapid changes in market demand can create obsolescence of plants, machines and intellectual property and can cause assets to lose some or all of their capacity to recover their costs. Moreover, poor decisions on resource allocations can impair the value of assets. In such situations, where a decline in the value of assets is recognized, it is possible for companies to write-down assets. The reporting of asset impairments is conceptually a function of economic factors. The recognition of asset impairments should be based on the comparison between the carrying value and the economic value of the asset. Moreover, in the absence of enforceable restrictions on the reporting of write-downs, managers may act discretionally, deciding to write-down on the basis of fiscal motivation or other incentives. As noted by Elliott and Shaw (1988): Asset write-offs "differ from most financial statement information because of greater discretion as to their magnitude and timing" (p. 92).

So, the discretion inherent in the accounting rules, combined with the potentially large size of write-downs, implies that managers could strategically adjust the timing and magnitude of such write-downs in order to recognize the impairments only when it is advantageous to do so.

Managerial discretion was substantial in the US before the mid-1990s as the accounting standards provided little authoritative guidance on the accounting for most types of asset impairments, other than inventory (Francis *et al*., 1996). By comparing the financial characteristics of each write-off firm with the average performance of a control group of firms in the same industry that did not announce write-offs, Elliot and Shaw (1988) and Strong and Meyer (1987) show that the typical write-off firm was highly leveraged, had a weak total return to shareholders and had experienced a recent change in top management. Moreover, the firms making discretionary write-offs were

significantly larger than other firms in their industries (in terms of revenues and assets) and had experienced deteriorating accounting performance in the write-off year and in the years preceding write-offs. Further evidence that the write-off decision is influenced by both asset impairment (proxied by poor historical firm performance and declining industry trends) and managers' incentive to manipulate earnings (proxied by the occurrence of management changes) is provided by Francis *et al*. (1996).

Subsequent studies have shown that asset write-downs may be used strategically even in the presence of authoritative guidance. Widespread concerns about the frequency and magnitude of write-downs led the Financial Accounting Standard Board in 1995 to adopt SFAS No. 121, which specifies the criteria for determining whether impairment of long-lived assets has occurred and how much impairment should be recognized. Boone and Raman (2007) and Riedl (2004) analyze US data after the introduction of SFAS No. 21 and both conclude that write-downs are still significantly correlated with proxies for opportunistic reporting.

The international evidence is limited but broadly in line with the findings based on US data. Both Cotter *et al*. (1998) and Loh and Tan (2002), using data respectively from Australia and Singapore, find that the magnitude of asset write-offs is associated with impairment and asset value declines; moreover, the presence emerges of a positive relationship existing between firms' accounting write-offs and their management changes.

The most important limit of the write-down literature is that it has rather neglected the role of taxes in write-down decisions. To the extent that write-downs are tax deductible, they can be used to reduce the tax burden of a firm. The reduction will be temporary in the case of a depreciable asset, as the write-down reduces future depreciation allowances. Still, a profitable firm may reduce the effective tax burden, measured by the present value of present and future taxes, by delaying the tax payments into the future.

There are few papers that claim the presence of a fiscal effect affecting write-down decision. Strong and Mayer (1987) provide some evidence of the relevance of taxes, documenting a significant negative relationship between write-downs and the increase in the amount of tax-loss carry-forwards with respect to the previous year. As the increase in loss carry-forwards may be seen as a proxy for a low effective marginal

tax rate, the finding suggests that discretionary write-downs may be tax motivated: firms find it advantageous to increase write-downs of depreciable assets when the marginal tax rate is high in order to delay the tax on income. Garrod *et al.* (2008) argue that tax minimization is a relevant factor in explaining the choice and the magnitude of asset write-offs based on their cross-sectional analysis of a large sample of Slovenian small private companies (SPCs). They find that more profitable companies are more likely to write-off and their write-off magnitude is greater. Assuming that in SPCs there are no agency issues between owners and managers and that owner-managers of SPCs are exposed to pure incentives to minimize rationally the present value of present and future tax payments, Garrod *et al*. (2008) interpret their finding as evidence that write-offs are used as a tax-reducing accounting practice.

A common weakness of these two papers is that they rely on proxies for firms' tax status that capture the fiscal effect with a large error and that may be correlated with other variables that affect write-downs. Accordingly, as suggested by Shackelford and Shevlin (2001), caution must be exercised in interpreting the results. This point is clearly illustrated by the fact that both papers use losses as a control variable but they provide a different interpretation for the estimated coefficients. As mentioned before, Strong and Meyer (1987) find a *negative* association between losses (namely an increase in loss carry-forwards) and write-downs and interpret it as the proof that write-downs are lower when the effective tax rate is lower. Garrod *et al*. (2008) find a *positive* association between the probability and the magnitude of write-offs and losses and interpret it as evidence that write-offs reflect in part actual asset impairment.

This problem has been recently acknowledged by Kosi and Valentincic (2012). They try to disentangle the tax-minimization incentive from other incentives by comparing writing off decision in two separate regimes, one that generates tax savings and one that does not. Kosi and Valentincic (2012) analysis provides convincing evidence that taxes do play a role in writing off decision. However it fails to provide an estimate of the magnitude of the tax effect.

This paper aims at overcoming this limitation by testing the impact of taxes on companies' write-down decisions, using a proxy for the company-specific marginal tax rates computed following the Graham–Shevlin methodology (Graham, 1996a, 1996b, 1999; Shevlin, 1990). The panel dimension of data, the high frequency of tax reforms

implemented in the sample period and the highly non-linear structure of the Italian corporate income tax bring about considerable cross-sectional and time-series variation in the simulated *MTRs*, which allow us to identify tax effects clearly and to estimate the impact of the tax rate on the probability and magnitude of write-downs.

The second strand of the literature related to this paper is the empirical research in accounting analysing the interaction between taxes and other factors in business decisions. Papers in this field focus on the trade-off between tax minimization and other organizational goals. Shackelford and Shevlin (2001) provide a thorough review of this literature by distinguishing between papers that address the interaction of financial reporting and tax factors and papers that examine the effects of agency costs on tax minimization. Although tax accounting and financial accounting often differ in revenue recognition and other important concerns, tax plans often result in reporting lower book income. As a consequence, tax planning affects financial accounting choices and financial accounting considerations affect tax plans. Evidence of the book–tax trade–off has been provided in several fields such as corporate financing decisions, divestiture method, inventory accounting, R&D expenditure decision, compensation policies and pension plans (Shackelford and Shevlin, 2001). The research addressing taxes and agency costs is much less well developed than the book–tax coordination literature. An issue that has received attention in recent years is the link between tax planning and ownership structure. Chen *et al*. (2010) examine the impact of family ownership and control on tax aggressiveness and provide evidence that family firms are less tax aggressive than their non-family counterparts.

However, the effect of taxes and the trade-off between taxes and financial reporting implications (or agency costs) on firms' accounting choices represents an area where researches should continue to focus. As pointed out by Shackelford and Shevlin (2001), in order to capture the effect of tax and non-tax trade-off on firms' choice, it will be more appropriate to implement a model specification that includes an interaction term between tax and non-tax incentives. Following the research undertaken by Klassen (1997), it will be interesting to analyze the impact of the book–tax trade-off on companies' accounting decisions, in a context characterized by the presence of agency relationships. As recently noted by Hanlon and Heitzman (2010), a better understanding of the book-tax trade-off is crucial for assessing the impact of taxes on

corporate "real" decisions, such as investment and capital structure, which affect economic activity and have implications for the future structure and efficacy of tax policy.

By using the simulated MTR we can test for the existence of a trade-off between tax and non-tax motivation in writing down decisions. In particular we found evidence of an interaction between tax minimization, financial reporting costs and agency costs. Tax motivated write-downs seems to be constrained by financial reporting and agency considerations.

3 Institutional background

3.1 Accounting for write-downs of equity investments

Our sample contains data on impairments of long term equity investments recorded among financial assets. The Italian accounting rules establish that an equity investment occurs when a company purchases part of the owners' equity of another company. Long term equity investments are normally held for strategic reasons. For example, a firm which holds a substantial part of the equity of one of its suppliers could make pressure in order to obtain better terms or preferential deliveries of suppliers. On the other hand, a firm may invest in that supplier's equity because it wishes to influence or control the future policy and direction of the investee company.

Where a company invests in the equity of another company, the Italian accounting system requires recording the value of long term equity investment in the financial assets section of the balance sheet. It allows to choose between three different methods of equity investments accounting: cost, equity or break-up value. The adoption of International Financial Reporting Standards (IAS/IFRS)[3], from 2005 onwards, did not change significantly the methods of equity investments accounting. In particular the IAS 27 (Consolidated and Separate Financial Statements) establishes that in the parents/investors individual financial statements, investments in subsidiaries, associates,

[3] The adoption of International Financial Reporting Standards was required for all companies listed in regulated European markets by the European Union, through the Commission Regulation no. 1606/2002. The Italian Government implemented the Regulation in 2005. For listed companies, financial institutions, banks and other regulated financial companies IAS/IFRSs were optional in 2005 and became mandatory from the 2006 financial year. All other companies had the option to adopt IAS/IFRSs since 2005.

and jointly controlled entities should be accounted for either at cost, equity or at fair value (in accordance with IAS 39).

If managers believe that a permanent decline in equity investments has occurred, at the end of the fiscal year equity investments have to be accounted at this lower value, with a write-down[4] in the investment valuation[5]. The write-down is based on the management's judgement that the equity investments have experienced a permanent reduction in value. The write-down has to be accounted as a loss on investments in the "value adjustments to financial assets" section of the income statement. The Italian accounting rules for investment write-downs remained unchanged from 1998 to 2006. The introduction of IAS/IFRS, which was not mandatory for the most of the companies included in the sample[6], did not eliminate the discretion in the decision to write-down equity investments. In fact, the IAS39 (the International Accounting Standard that regards financial instruments: recognition and measurement) establishes that an entity shall assess at each reporting date whether there is objective evidence that a financial asset is impaired as a result of one or more events that occurred after the initial recognition of the asset. If an impairment is recorded, the amount is calculated with reference to IAS 36 (Impairment of Assets).

3.2 Tax treatment of equity investment write-downs in Italy

Up to 2003 fiscal year write-downs[7] of equity investments were fully deductible from the tax base. In order to restrain avoidance strategies, the law required that, in the presence of equity investments evaluated using the equity method, the deductible write-downs cannot exceed the impairment evaluated using the cost method (comma 1-ter art. 66 TUIR[8]). Further anti-avoidance provisions, for the write-downs of equity investments accounted using the cost method, were introduced in 2002, with the legislative decree no. 209. In particular, this decree established that the write-downs should be calculated with reference to the reduction in the equity value of the investee

[4] The Italian accounting rules didn't change in the case of complete downward revaluations of equity investments (i.e. write-offs).
[5] Article no. 2426 of Book V of the Italian Civil Code.
[6] See footnote 3.
[7] The Italian tax rules does not discern write-downs from write-offs of equity investments.
[8] The TUIR (*Testo unico delle imposte sul reddito*) represents Italy's income tax consolidated text.

company net of distribution of retained earnings, non-deductible goodwill amortizations and non-deductible provisions.

In 2003 the Government implemented a tax reform, introducing the participation exemption rule, which provides the exemption from the corporate tax base of capital gains and losses arising from the disposal of corporate shares and investments in other companies[9]. The same reform ruled out completely the possibility to deduct the write-downs of equity investments.

4 Tax consequences of investment write-downs: the marginal tax rate

When deductible, a marginal increase in write-downs of equity investments implies a reduction in tax liabilities, measured by the marginal tax rate, which is defined as the present value of current and expected future taxes paid on an additional unit of income earned today. If a firm has positive taxable income the *MTR* is equal to the statutory tax rate. Otherwise, if a firm has no taxable income today, an additional unit of income reduces the losses that can be carried forward and used to offset the taxable income in future years. In this case the *MTR* is equal to the discounted value of the taxes paid on the marginal unit of income in the first year when the firm is expected to have positive taxable income.

Up to 2003 Italian companies were subject to the corporate income tax called IRPEG (*Imposta sul reddito delle persone giuridiche*). The base for IRPEG was accounting income (as defined under the Italian Civil Code), subject to some adjustments. From 1998 to 2000 the tax rate on IRPEG was stable at 37%; it was reduced to 36% in 2001 and to 34% in 2003. Companies with negative taxable income were allowed to carry forward losses to offset the taxable income up to the following 5 years. Current-year losses could be added to any unused losses from previous years. No tax-loss carry-backs existed under IRPEG.

[9] In order to qualify for the exemption of capital gains, four requirements must be met: the stocks should be held for a minimum period of time (holding period) and should be booked as a long-term asset in the shareholder's financial statement (booking requirement); the company whose stocks were sold should actively run a business (active business requirement) and (if it is located in a foreign country) it should not be resident in a low-tax jurisdiction included in a "black list".

In 1997 the corporate tax regime was amended according to an *Allowance for Corporate Equity* scheme with the aim of reducing the cost of equity financing. This new scheme was commonly named DIT (Dual Income Tax).

Taxable income was split into two components. The first was a measure of the opportunity cost of new equity financing and was named *ordinary income*. It was computed by multiplying the interest rate on long-term government bonds (plus a measure of the equity risk premium) times the value of new share issues and retained earnings since 1996. The second component was given by the difference between total taxable income and *ordinary income* and was named *excess profits*. This second component was taxed at the IRPEG tax rate while *ordinary income* was taxed at a reduced rate of 19%. Furthermore, the reform set a minimum average tax rate equal to 27%[10]. When the taxable income was smaller than the *ordinary income*, the difference could be carried forward and added to the *ordinary income* in the following years (up to 5 years).

Therefore, the corporate taxation rules governing Italian companies between 1998 and 2003 entail that, in order to calculate the MTR, it is necessary to distinguish three different cases:

1. in year t a company has positive taxable income, it has no unused losses of previous years to carry forward and it has no share of *ordinary income* unused to carry forward[11]. In such a situation, an additional unit of income pays the comprehensive tax rate. Hence, the MTR is equal to:

$$MTR = \tau_{IRPEG}$$

where τ_{IRPEG} represents the statutory IRPEG tax rate in force in year t.

2. in year t a company has positive taxable income, but it has a share of *ordinary income* unused to carry forward. An additional unit of income produces two changes in the company's tax position. First, it increases the tax liabilities by the minimum tax rate. Second, it reduces the *ordinary income* that can be

[10] The limit according to which the average tax rate had to be higher than 27% was abolished in 2001; but in 2002 a new limit was introduced, according to which the average tax rate had to be higher than 30%.
[11] A company will have a share of *ordinary income* to carry forward if its average tax rate results as exactly equal to the minimum tax rate admitted by the fiscal regime (set equal to 27% up to 2001 and equal to 30% in 2002 and 2003).

carried forward and used to calculate the IRPEG in the following years. If in year $t+1$ the company cannot use the share of *ordinary income* in excess in year t, the firm next applies the *ordinary income* in excess to the taxable income in year $t+2$ and so on. Assume that $t+n$ is the first year when the company uses the share of *ordinary income* unused in year t. In this situation two different scenarios may take shape:

a. if $n>5$ a reduction in year t in the *ordinary income* to carry forward has no consequences for the IRPEG that the company will pay in the following 5 years. In this case the MTR is therefore equal to the minimum tax rate;

b. if $n \leq 5$, a unit increase in the income of year t translates into a unit decrease in the IRPEG paid in year $t+n$. In this case the MTR is equal to the minimum tax rate plus the discounted value[12] of the IRPEG saved in year $t+n$.

Summarizing:

$$MTR = \tau_{IRPEG} \qquad \text{if } n>5$$

$$MTR = \tau^{m}{}_{IRPEG} + \frac{\tau_{IRPEG} - \tau_{DIT}}{(1+r)^{n}} \qquad \text{if } n \leq 5$$

where $\tau^{m}{}_{IRPEG}$ represents the IRPEG minimum tax rate in force in year t and τ_{DIT} represents the reduced tax rate (set equal to 19%).

3. in year t the IRPEG tax base is negative or the company has unused losses of previous years to carry forward. In this case the MTR is equal to the discounted value of the additional IRPEG, which will be:

$$MTR = 0 \qquad \text{if } n>5$$

$$MTR = \frac{T}{(1+r)^{n}} \qquad \text{if } n \leq 5$$

where $T = \tau^{m}_{IRPEG}$ or τ_{IRPEG} depending on the value of *ordinary income* in year t.

[12] Taxed paid from the year *t+1* to the year *t+5* are discounted using the average yield of a set of government and listed bonds. We received the data from Mediobanca.

In 2003 the Italian Government implemented a tax reform, which, came into force in 2004, replaced the IRPEG with a new corporate tax named IRES (*Imposta sul Reddito delle Società*). The reform established the reduction of the statutory tax rate from 36% to 33% and repealed the DIT scheme. As in the IRPEG regime, it was established the possibility for companies with negative taxable income to carry forward losses to offset the taxable income up to the following 5 years and to add current-year losses to any unused losses from previous years.

Therefore, since 2004, due to the abolition of the Dual Income Taxation, we have only two different scenarios:

1. in year t the IRES tax base is positive and the company has no unused losses of previous years to carry forward. An additional unit of income pays the comprehensive tax rate. Hence, in this case, the MTR is equal to:

   $$MTR = \tau_{IRES}$$

   where τ_{IRES} represents the statutory IRES tax rates;

2. in year t the IRES tax base is negative or the company has unused losses of previous years to carry forward. The MTR is equal to the discounted value of the additional IRPEG that will be paid in year $t+n$:

$$MTR = 0 \qquad \text{if } n > 5$$

$$MTR = \frac{\tau_{IRES}}{(1+r)^n} \qquad \text{if } n \leq 5$$

4.1 Computation of the marginal tax rate

In order to compute the true value of MTR three sets of information are required. The first one regards the corporate taxation rules, namely the level of the statutory tax rate and the tax code treatment of net operating losses. The second one is the value of losses and *ordinary income* in excess in the previous five years to carry forward. Since such information is not available for the fiscal years 1993–1996, in order to estimate the value of MTR, following Altshuler and Auerbach (1990), Alworth and Arachi (2001), Graham (1996a) and Shevlin (1990), we assume that the value of losses and the share of *ordinary income* in excess to carry forward was nil. The bias in the $MTRs$ due to this assumption tends to disappear over time. The third piece of

information needed to compute the MTR is managers' expectations of future income flows. We proxy managers' expectations using the methodology proposed by Graham (1996a, 1996b, 1999) and Shevlin (1990), based on the assumption that taxable income follows a pseudo-random walk with drift:

$$\Delta Y_{it} = \mu_i + \varepsilon_{it}$$

where ΔY_{it} is the first difference in pre-tax and write-downs income of company i in year t, μ_i is the sample mean of ΔY_{it} and ε_{it} is a normally distributed random variable with mean zero and variance equal to that of ΔY_{it} over the years 1998–2006.

When, in a given year, the IRPEG (IRES since 2004) tax base is negative, or there are unused losses of previous years to carry forward or there is a share of *ordinary income* in excess to carry forward, we run 100 simulations of income in the following 5 years using a different random normal realization of ε_{it} for each year. For each simulation we calculate first the present value of taxes to be paid taking into account loss carry-forward provisions[13]. Then we add a unit of income in the reference year and recalculate the present value of the tax bill. By taking the differences between these two present values, 100 simulations of the marginal tax rate are obtained. We use their average as the proxy for the "true" marginal tax rate. This procedure is adopted for each company in the sample.

Graham (1996b) argues that this proxy is the best predictor of the marginal tax rate calculated on actual income realizations. This claim has recently been questioned

[13] In calculating the present value of taxes to be paid in the following 5 years, it would have been possible to use two different approaches: the first solution hypothesizes that managers in year *t* forecast exactly the statutory tax rate that will be in force in the following 5 years; the second solution, instead, hypothesizes that managers in year *t* conjecture that in the following 5 years the statutory tax rate will be exactly equal to that of the current year. Both the alternative results are too extreme, since it appears unrealistic to suppose on one side the possibility to forecast exactly the value of the statutory tax rate that will be in force in the following 5 years and on the other side to suppose the impossibility for managers to know in year *t* at least what the statutory tax rate in force in year *t+1* will be. We follow a midway approach, supposing a mix of these two alternatives. We hypothesize that if in year *t* it is announced a regulatory change which will be in force from year *t+1* onwards, in calculating the present value of taxes to be paid in the following 5 years managers, in year *t*, take into account this regulatory change and, if in year *t* it is not differently specified, they will conjecture that this regulatory change will be in force up to year *t+5*. Otherwise, if in year *t* no one regulatory change is announced, we suppose that managers in year *t* conjecture that in the following 5 years the statutory tax rate will be exactly equal to that of the current year.

by Blouin *et al*. (2010)[14]. They show that the Shevlin/Graham *MTR* forecasting approach produces inaccurate estimates of mean future income (too high when the current income is high and too low when the current income is low) and underestimates the future volatility of income for all income groups. Alternatively they propose a non-parametric procedure to estimate the marginal tax rate. The reasons are twofold. First, income is better described by a mean-reverting process than a random walk, due to transitory components in accounting income and economic factors such as entry and exit. Second, when a firm's assets and income grow over time, the historical volatility measured since inception is likely to understate the future volatility substantially. However, in our analysis the bias in the *MTR* calculated according to the Shevlin/Graham methodology is limited by two factors. First, our sample covers a significantly shorter period than the one analyzed by Blouin *et al*. (2010) (27 years from 1980 to 2007); this should reduce the underestimation of income volatility for growing firms. Second, loss carry-forward is limited to 5 years in Italy compared with 22 years in the US. The shorter forecasting horizon should reduce the error in the simulated *MTR*. Moreover, Graham and Kim (2009) demonstrate the importance of using firm specific data when estimating marginal tax rates and show that the non parametric approach proposed by Blouin *et al.* (2010) produces a distribution of *MTRs* characterized by too many observations clustered near the center.

The endogeneity of the tax status may produce a spurious correlation between the write-down decision and the marginal tax rate. By recording investment write-downs, which benefit from deductibility, a company reduces its taxable income and potentially lowers its *MTR*. This may result in a negative correlation between investment write-downs and estimated *MTRs*, even if high taxes induce companies to account write-downs in order to reduce their tax burdens. In order to avoid this spurious correlation, following Graham *et al.* (1998) and Alworth and Arachi (2001), we compute a measure of the marginal tax rate based on the income before taxes and before write-downs deductions, which results not endogenously affected by write-down decisions.

[14] We would like to thank Reinald Koch for bringing this paper to our attention.

Besides the Shevlin/Graham proxy (which we refer to as MTR), we consider an additional measure for the marginal tax rate. This alternative variable (which we will refer to as the taxable income dummy: TID) assumes that managers, when computing the relevant marginal tax rate for investment decisions, set it equal to the top statutory tax rate when the company has a positive value of income before taxes and before write-downs of equity investments and equal to zero otherwise. By assuming a sort of myopic behaviour the variable *TID* has lower across-company variability when compared with the MTR.

5 Non-tax motives for write-downs

Tax minimization is not the only factor that drives discretionary write-downs of equity investments. On one hand, managers may record write-downs of equity investments to account for poor participated firm performances. On the other hand, tax-motivated write-downs of equity investments may bring about non-tax costs. We consider several variables to control for non-tax effects.

For expositional purposes it is expedient to group the control variables into three categories: impairment motive, financial reporting costs and agency relationships. However, it is possible that some variables may catch different effects (for example a variable may proxy both the impairment motive and some financial reporting costs). Table 1 summarize all the variables included in the econometric model and their computation.

5.1 Impairment motive

Firms may write-down equity investments in the presence of a complete or partial downward revaluation of an investee company. Unfortunately we do not have data on the results recorded every year by the investee companies. Therefore, we use several variables to proxy for the investee company's performances, some of them reflecting the trend of the performance of the investor company. The implicit assumption is that firms will be more likely to invest in the equity of companies that are in the same industrial sector.

The first control is the trend of the stock market (SM_{st}) measured by the annual change in the stock exchange index for each industrial sector *s* and year *t* from 1998 to

2006[15]. We presume that with a decreasing stock market trend it is more likely that the investee company will experience a decline in value, which may trigger the write-downs of equity investments by the investor.

Following Francis *et al*. (1996), we also use two additional variables to proxy for the performance of the investor firm's industry: the average sales growth (IND_GRO_{st}) and the log of GDP ($LGDP_{st}$). It is possible to consider these variables as proxies for the impairment motive, supposing that the investor and the investee company are in the same industrial sector and that a poor industry performance may result in a permanent reduction in the investee profitability. If this is the case, we should find a negative relationship between industry growth and the propensity to write-down equity investments. However, these variables could also be considered proxies for financial reporting costs. In this case, we may find a positive relationship with write-downs, since for firms in declining industries it will be very important to record better performance in order to reduce the financial reporting costs. Summarizing, we have no definite prior on the sign of the coefficients associated with *IND_GRO* and *LGDP*.

5.2 Financial reporting costs

The trade-off theory suggests that firms balance the benefits of write-downs (e.g. a reduction in taxable income) with their costs related to financial reporting. Many financial agreements with stakeholders (for example with creditors, lenders or customers) use accounting numbers to specify the terms of trade, affecting managers' willingness to report lower income. Thus, the choice to write-down equity investments involves weighing the tax incentive to reduce the taxable income against the financial reporting incentives to increase the book income in order to ameliorate the external stakeholders' perception of the company. We use several variables to control for the impact of the external perception of the company.

Our assumption is that more indebted companies will be less likely to make accounting write-downs of equity investments, because they should prefer to record

[15] Considered that in the sample are included equity investments in foreign countries, it would have been appropriate to proxy the investee company's performance using the trend of the stock market index of the investee company's country. Due to the impossibility to know in which country are localized the investee companies, we decided to use the Italian stock exchange index The data are from BORSA ITALIANA, "Indici MIB Storici Settoriali, base 30.12.1994=1000".

better performance in order to maintain their creditworthiness and avoid an increase in the costs of debt (e.g. Bontempi *et al*., 2004). For this reason we control for the debt to equity ratio LEV. To take into account potential non-linear effects, we also control for $LEVW$, which is equal to the value of the debt to equity ratio weighted according to the ratio equity investment/total assets. A negative (positive) sign of the estimated coefficient would signal that the negative impact of high leverage on the probability and magnitude of write-downs is higher (lower) the higher is the share of equity investment in total assets.

For very profitable companies external financing becomes less important. As a consequence we expect that very profitable companies can freely choose to write-down their impaired assets. To control for this effect we use the variable *PROF* defined as the ratio between the EBIT and the total assets of the preceding year (Garrod *et al*., 2008; Kosi and Valentincic, 2012).

Moreover, we expect that firms will be more cautious about writing-down equity investments if they are in financial distress. Following Alworth and Arachi (2001), Graham *et al*. (1998) and MacKie-Mason (1990), we proxy financial distress through a modified version of Altman's (1968) Z-score, defined as:

$$ZSC_{it} = 3.3 \cdot \frac{(EBIT)_{it}}{(Total\ Assets)_{it} + (Write-offs\ of\ Equity\ Investments)_{it}} + 1.2 \cdot \frac{(Working\ Capital)_{it}}{(Total\ Assets)_{it} + (Write-offs\ of\ Equity\ Investments)_{it}} + 1.0 \cdot \frac{(Sales)_{it}}{(Total\ Assets)_{it} + (Write-offs\ of\ Equity\ Investments)_{it}}$$

The lower the *ZSC*, the higher the probability of bankruptcy. To account for potential non-linear effects of financial distress we also use *ZSCW*, which is equal to *ZSC* times the ratio between equity investments and total assets.

The cost of borrowing is also affected by liquidity and firm size. We expect that illiquid firms face higher ex ante borrowing costs and are less likely to make accounting write-downs of equity investments to prevent a further increase in the costs of debt. We measure liquidity with the current ratio (CR). We also assume that tangible assets increase a company's debt capacity, because these assets are promptly marketable in the case of short-notice liquidation and control for the value of tangible assets as a share of

the total assets (*TA*) (e.g. Graham, 2000). As to firm size, we expect larger companies to be keener to make accounting write-downs of equity investments than smaller ones as they have lower ex ante costs of financial distress, due to diversification. Large firms may also benefit from lower informational costs associated with borrowing. Firm size (*SIZE*) is gauged with the natural log of real sales accounted in the year preceding the accounting of write-downs (e.g. Francis *et al*., 1996).

Other incentives could influence management decision to manage earnings through write-downs of equity investments. By one hand, the "big bath" literature suggests that companies have incentive to record discretionary losses in period of unusually low earnings. To take a bath is seen as a signal to investors that bad time ended and better time will follow. The big bath strategy has been considered often a probable motivation for accounting asset write-offs (Mime, 1986; Burton and Miller, 1986). Moreover, if management compensations are earning based and if pre write-downs earnings are already too far from the target, managers have incentive to shift future write-downs into current year. All these arguments suggest a negative correlation between pre write-down income and write-downs. However, it may occurs that in periods of already low earnings companies, driven by financial reporting incentive to improve their external perception, could decide to reduce discretionary investments write-downs, in order to increase their book income. By the other hand, the "income smoothing" literature implies the purposeful intervention in the process of reporting income numbers, with the objective of minimizing the variance of reported earnings and maintaining a steady and predictable rate of earnings growth (Moses, 1987). In particular, when income is unusually high, exceeding the upper bound specified in earnings based bonus plans, management is boosted to record discretionary write-downs. To proxy for these two separate effects, following Bartov (1993), Francis *et al.* (1996) and Riedl (2004) we define two variables for when pre write-downs income is low (*BATH*) and when it is high (*SMOOTH*). To compute both these variables, it is expedient to define the variable *IC* (income change), measured as the difference between pre tax and write-downs income in year *t* and pre write-downs income in year *t-1*, divided by total assets at the end of year *t-1*. In year *t* the variable *BATH* takes a value equal to *IC* when *IC* is below the median of its nonzero negative values, and the value 0 otherwise; symmetrically the variable *SMOOTH* takes a value equal to *IC* when

IC is above the median of its nonzero positive values, and the value 0 otherwise. The income smoothing literature predicts a positive association between *SMOOTH* and write-downs of equity investments. The correlation between *BATH* and write-downs cannot be signed a-priori: it could be either positive or negative according to whether the big bath or the financial reporting incentive dominates during a period of unusually low income.

5.3 Agency relationships

Companies' ownership structure could affect accounting decisions, since in the case of separation of ownership and control, the interests of management and the firm's ownership are not always perfectly aligned. Management has the incentive to act in a manner consistent with maximizing pre-tax income, whereas owners are more likely to act in order to minimize the fiscal burden. According to Garrod *et al*. (2008) and Kosi and Valentincic (2012), we suppose that the ownership structure of small private companies leads to no significant separation of ownership from management. So, we control for the effect of ownership structure on the decision to write-down through the dummy variable *SPC*, which assumes a value of 1 for small private companies and a value of 0 for large and public ones. The criteria that denote a company as a "small private company" are defined in terms of total assets, sales revenues and number of employees. In particular, a company is defined as small if it is not listed, has a number of employees that does not exceed 50 and fulfils one of the 2 following criteria: the total assets at the end of the fiscal year do not exceed 10 million euro, or the sales revenues at the end of the fiscal year do not exceed 10 million euro[16]. We expect that small private companies are less affected by agency problems in the decision to write-down equity investment.

Finally we also control for the presence of foreign investee companies[17], which may affect the decision to write-down equity investments because managers have higher

[16] This definition coincides with the one used in Italian legislation.
[17] The presence of foreign investee companies is assessed in 2006 as the data set contains no information for previous years.

discretion given that it is more difficult for shareholders and tax authorities to verify the real impairment of foreign investee firms[18].

Table 1 provides the description and the computation of each variable included into the econometric model.

6 Data and summary statistics

The accounting data are gathered from the AIDA database, compiled by Bureau van Dijk Electronic Publishing, containing accounting information on Italian corporations. Initially we identified a balanced panel composed by 6,964 companies having balance sheet data in every years between 1997 and 2006, distributed across 26 economic sectors as defined in the ATECO classification by the Italian National Institute of Statistics (ISTAT). We excluded from the sample the observations relating to years in which a firm has no participating company and that relating to years in which the value of write-downs is higher than the value of equity investments of previous year[19]. Finally the sample was purged by 741 observations, due to the presence of inconsistent data[20]. The result is a non-balanced panel data set, described in table 2.

Table 2 also provides summary statistics on the fiscal status of the companies included in the sample, showing that the percentage of companies having positive income before taxes and write-downs (column 3 of table 2) is almost stable from 1998 to 2001 (around the value of 91-92%), while it decreases from 2002 on, reaching the value of 86.71% in 2006. In contrast, the share of writing-down companies (column 5 of table 2) shows an increasing trend up to 2003 and a decrease afterwards. Most of write-downs have been recorded by companies with positive pre-tax and pre-write-downs accounting income (last column of table 2).

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[18] Many papers in the write-down literature finds that write-down decision is influenced by the presence of changes in top management (i.e., Moore, 1973; Strong and Meyer, 1987; Francis *et al.*, 1996; Boone and Raman, 2007). This result is consistent with the decision making literature suggesting that it is easier for new management to terminate old projects, to reassess the value of existing assets and to initiate new programs. Unfortunately we cannot test for such effect as we do not have data on changes in top management.

[19] In theory, the value of write-downs may exceed the value of equity investments of previous year if a company in year *t* acquires equity investments and at the end of the same fiscal year decides to write-down such investment. We expect this to be a residual case and assume that observations where the value of write-downs exceeds the value of equity investments of previous year are erroneous and decided to exclude them from the sample (884 observations).

[20] For example, we dropped observations with a negative value of some variables such as total assets, net worth, debt, sales, equity investments or write-downs of equity investments.

Among the companies included in the sample, 1,500 never accounted write-downs of equity investments; 2,599 companies recorded write-downs at least in one fiscal year and 37 companies record write-downs in every fiscal year during the period 1998-2006.

Figure 1 shows the trend of the mean value of write-downs of equity investments, as a percentage of total assets of previous year (*WOTA*), from 1998 to 2006, computed over the entire sample. From 1998 to 2003 there is an increasing trend: the value of *WOTA* grew from 0.19% to 0.24%, with the only exception of the 2000 small decrease. The peak of *WOTA* in 2003 coincides with the reform of the Italian fiscal system, which abolished the deductibility of write-downs of equity investments from 2004 onwards (2003 was the last year in which firms could benefit from the deductibility of write-downs of equity investments). From 2004 to 2006 there is a steady decrease in *WOTA*, which reduces to 0.14% in 2006. This is consistent with the hypothesis that up to 2003 part of the write-downs of equity investments was motivated by tax planning strategies.

Figure 1. **Write-downs of Equity Investments with respect to Total Assets**

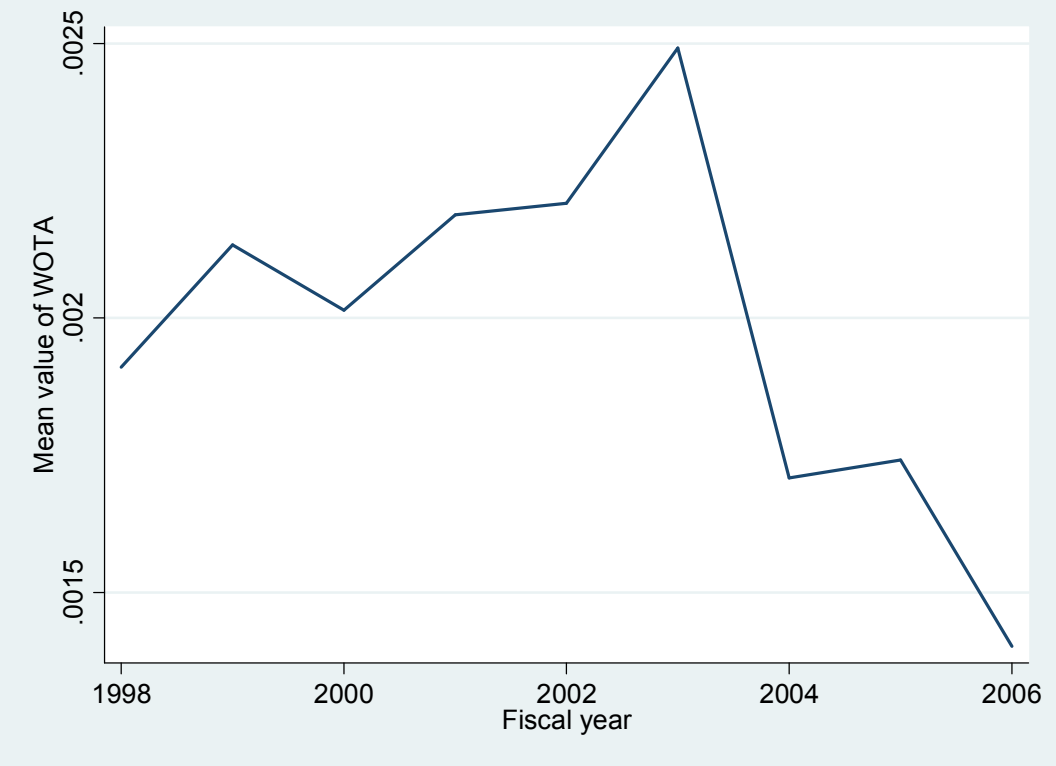

Figure 2 shows the distributions of the simulated *MTRs* for the companies in the sample. The *MTRs* are aggregated for sub-groups of years with the same statutory tax rate. The time-series variation in the *MTRs* is primarily due to the change in statutory tax rate, which decreased from 37% to 33% during the years 1998-2006. The figure shows that most companies faced the maximum statutory tax rate (i.e. the most of the companies had positive taxable income). In particular, the percentage of companies facing the maximum statutory tax rate is almost stable (equal to 80%) during the period considered (see table 2) and is consistent with the findings of previous studies (Alworth and Arachi, 2001) on Italy.

Figure 2. **The Distribution of the Simulated MTRs**

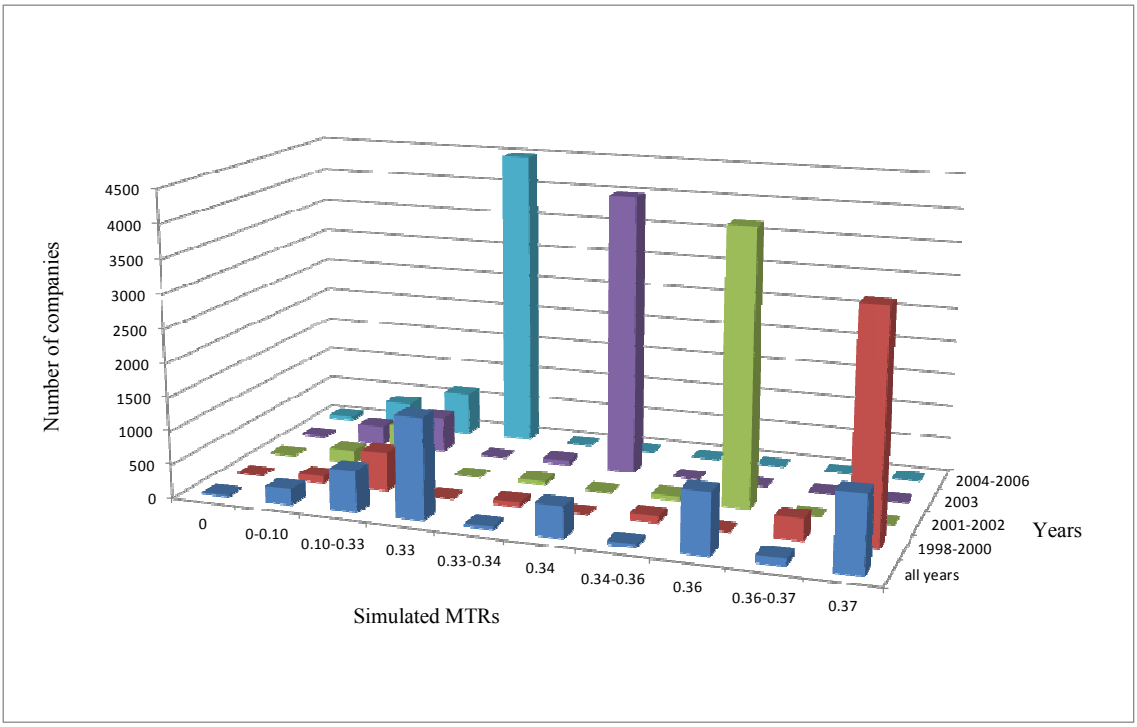

Table 3 reports summary statistics of all the variables included in the empirical model. The dummy variable *WO* , which indicates whether firms recorded write-downs of equity investments, has a mean of 0.161 and a standard deviation of 0.368. The ratio between write-downs of equity investments and total assets of previous year ranges between 0 and 39.4%, recording a mean value of 0.2%. The marginal tax rate simulated using Graham's methodology (*MTR*) has a mean of 0.317 and a standard deviation of

0.083, while the alternative proxy (*TID*) has a similar mean (0.313) and a higher standard deviation (0.11).

Table 4 reports mean values for write-downs and marginal tax rates (*MTR* and *TID*) disaggregated by industrial sectors. The data show that the lower percentage of write-down companies is in the sector "*Education*", while more than one half of the companies in the sector "*Social Security*" account write-downs of equity investments. As well as the variable *WO*, the minimum mean value of *WOTA* has been recorded by firms in the sector "*Education*", while the higher one has been recorded by the firms in the sector "*Financial Intermediation*". Looking at the marginal tax rate the sector "*Healt and social work*" has reached the higher value of *MTR* (33.6%), while, the sector with the higher value of *TID* is "*Education*" (35%).

Table 5 presents the correlation for the independent variables: the variables *ZSC* and *LEV*, both weighted according to the ratio equity investment/total assets, have the highest correlation (0.496); strong results also the correlation between the dummy variable *SPC* and *SIZE* (-0.412); the level of profitability is highly correlated to both the fiscal variables (the correlation results respectively equal to 0.396 for *MTR* and 0.361 for *TID*). As expected the two alternative fiscal variables *MTR* and *TID* are highly correlated (0.87). There is no significant correlation between the remaining explanatory variables included in the empirical model.

7 Estimations and results

The empirical analysis proceeds in two steps. First we test whether taxes affect to the decision to record write-downs of equity investments. Using as dependent variable *WO* (a dummy variable which takes value 1 for firms that have recorded write-downs of equity investments and value 0 otherwise) we have a binary choice model. The multivariate analysis relies on a probit random effects model[21] with yearly dummies, in order to control for fixed time effects.

[21] The choice of the random effects model is driven by the structure of the sample. Since the empirical analysis is based on a not exhaustive sample extracted by a population, the random effects model allows us to make inference about the population from which these cross-section data came. Moreover, with large values of *N* and small values of *T* we estimate only the mean and the variance of the random effects (instead of estimating *N* fixed effects), saving a lot of degrees of freedom (Maddala, 1987).

Subsequently, in the second step, we estimate the impact of taxes and non-tax costs on the magnitude of write-downs, measured by the ratio between write-downs of equity investments and total assets of the previous year. Following Francis *et al.* (1996), Riedl (2004) and Kosi and Valentincic (2012) we implement this analysis by estimating a tobit model.

7.1 Decision to write-down

For the sake of comparison with prior literature, the first column of table 6 shows the marginal effects obtained estimating the probit RE model (with the yearly dummies), without including the marginal tax rate among the control variables.

Among the proxies for the performance of investee companies only the *GDP* is statistically significant and it is positively linked to the probability of writing-down equity investments. The positive sign suggests that this variable can be better interpreted as a proxy for financial reporting. This result is in line with that of Francis *et al.* (1996), which find that firms in industries with an increasing trend are more likely to write-off.

As to the variables that proxy for the financial reporting costs, LEV, CR and $SIZE$ are statistically significant and have the expected signs. In line with Francis *et al.* (1996), Garrod *et al.* (2008), and Kosi and Valentincic (2012), write-downs are more likely in less leveraged and bigger companies; moreover, the lower is the value of the current ratio, the lower is the probability to account write-downs of equity investments. In contrast, profitability is not statistically significant.

The variable $LEVW$ is statistically significant and positively linked to WO, showing that the negative effect of leverage on write-downs is weaker the higher is the share of equity investments in total assets.

Contrary to our expectations, the variables ZSC and TA are both negatively linked to the probability of writing-down equity investments. Instead, the modified Z-score weighted with the ratio equity investments/total assets is statistically significant with the expected sign.

The proxy for big bath reporting is statistically significant and positively linked to the probability to account investment write-downs. This can be interpreted as evidence that during a period of unusually low income, the big bath strategy dominates financial reporting considerations. The proxy for income smoothing affects significantly

and positively the probability of write-downs (in line with Francis *et al.*, 1996, and Riedl, 2004).

The variable *PFC* is highly statistically significant and has the expected sign, confirming our hypothesis that companies with investments in foreign firms are more likely to write-down equity investments. There is no evidence that the ownership structure affects the probability of write-downs as the variable *SPC* is not statistically significant.

For expositional convenience the table does not report the estimated coefficients for yearly dummies. Only the yearly dummy for 2004, 2005 and 2006 are statistically significant and negatively signed suggesting a structural decline of write-off after the repeal of tax deductibility.

The second column of table 6 shows the marginal effects estimated when the marginal tax rate is added to the control variables. The inclusion of the fiscal variable changes neither the sign nor the significance of non-tax variables but the coefficient of the *MTR* is not statistically significant. However, this result may be driven by the structural break produced by the 2004 tax reform. To investigate whether the fiscal incentives to write-down have been affected by the reform, we split the fiscal variable *MTR* into two components: $MTR - PRE$ (*MTR* before the fiscal reform, equal to *MTR* up to 2003 and zero afterwards) and $MTR - POST$ (*MTR* after the fiscal reform, equal to *MTR* from 2004 to 2006 and zero otherwise). Then we implemented two different tests. First, we estimated the empirical model, over the full period, using both *MTR-PRE* and *MTR-POST* as controls. This allows to test whether the association between the fiscal variable and write-down differs in the pre-reform regime compare to the post reform regime. However, by running the regression over the full period, this test assumes that there has been no structural break in the relationship linking write-downs and all other remaining explanatory variable. This assumption is relaxed in the second test (described in table 7) where, following Riedl (2004), we stacked two regressions: the first where the observations are from the pre-reform period and the second where the observations are from the post-reform period. The stacking of the equations allows statistical tests of differences across the two regimes in coefficient estimates for all explanatory variables.

Both tests support our hypothesis that the reform has eliminated the fiscal motivation to write-down equity investments. Column 3 of table 6 shows that the probability of write-down increases with the firm's marginal tax rate in the pre-reform regime when such write-downs could be deducted from the tax base, while the marginal tax rate is not significant in the post-reform regime when write-down deductibility was repealed.

Table 7 reports the coefficient estimates for the stacked regressions. The results show that the association between the probability of write-downs and non-tax control variables is stable across the pre and post-tax-reform regimes. The differences in coefficient are statistically significant for three variables only, namely *ZSC*, *TA* and *SIZE*, but the sign and significance of the coefficient is confirmed across the two regimes. In contrast the estimates confirm that the coefficients for the marginal tax rate differ significantly across the two different fiscal regimes. In particular the coefficient of the *MTR* is not statistically significant after the 2004 tax reform, confirming the hypothesis that the repeal of deductibility has removed the fiscal motivation for equity write-offs.

In the light of the previous results the empirical model has been estimated over the full sample using *MTR-PRE* as a proxy for the marginal tax saving brought about by an equity write-down. The regression results (column 4 of table 6) implies that, when equity write-down can be deducted from the tax base, a mean-level unit increase in the marginal tax rate raises the probability to record write-downs by about 7.4%.

7.2 Sensitivity and robustness checks

Table 8 reports the results of several sensitivity and robustness checks.

First, we replicated the main analysis on a subsample of firms having positive income before taxes and write-downs. By focusing on such companies, it is possible to provide evidence on fiscal effects for a group of companies that needs to minimize taxes in the current year. The results (column 1 of table 8) show that by restricting the analysis to profitable companies (before taxes and write-downs) the magnitude of the fiscal effect on write-down decision increases, in the presence of write-down deductibility: a mean-level unit increase in *MTR-PRE* raises the probability to account write-downs by about 16% (almost 10 percentage points more than in the full sample).

Among the remaining control variables there aren't significant differences regarding the signs and the significance level obtained estimating the full sample, exception made for *SM* and *SPC,* which become statistically significant.

Second, we employed an alternative proxy for the marginal tax rate, the taxable income dummy (*TID*), which is a dichotomous variable based on the sign of the current period taxable income before write-downs of equity investments (Graham, 1996b). It takes a value equal to the top statutory tax rate for firms with positive income before taxes and before write-downs, and a value of 0 otherwise. As for the *MTR*s, we split this variable into $TID - PRE$ and $TID - POST$, in order to allow for a structural break due to the 2004 Italian fiscal reform. The regression results confirm that taxes are a significant driver of write-downs when they can be deducted from the tax base. They also confirm that the 2004 tax reform had removed the tax incentive to write-down.

Column 3 of table 8 reports the estimates obtained by restricting the sample to small private companies in which tax-minimization strategies should not be significantly affected by agency problems between ownership and management. The results show that by restricting the sample to small private companies, the effect of *MTR-PRE* on the probability to account write-downs increases to 11.3%. The signs and the significance level of the remaining control variables are similar to those obtained for the full sample, exception made for *BATH*, which becomes statistically insignificant.

Finally in columns 4 and 5 of table 8, we present the results obtained excluding from the sample, respectively, the firms with equity investments in foreign companies and listed companies. In both cases the results are very similar to those obtained for the full sample.

7.3 Interaction terms

In order to test whether firms trade-off tax savings and non-tax costs in choosing to write-down equity investments, we add to the base model several interaction terms obtained by multiplying the tax variable $MTR - PRE$ with all the control variables.

A significant coefficient in the interaction term is consistent with the hypothesis that firms trade-off tax and non-tax costs.

The results are presented in table 9. The interaction terms between the fiscal variable before the implementation of 2004 fiscal reform and the proxies for the level of

profitability, the size, the income smoothing behavior and the presence of small private companies are statistically significant and positively linked to the probability to account write-downs of equity investments, as expected. The negative signs of the coefficients on the interaction between *MTR-PRE* and *ZSC* and *MTR-PRE* and *TA* are not consistent with our intuition. They suggest that the fiscal incentive to write-down increases with financial distress and decreases with the value of tangible assets as a share of total assets. Quite surprisingly, the coefficients of all the remaining interaction terms are statistically insignificant.

Overall, the evidence of a trade-off between tax benefits and non-tax costs in discretionary write-downs for Italian companies during the years 1998-2006 is rather weak.

7.4 Magnitude of write-downs

In this section we investigate the factors that may affect the magnitude of discretionary write-downs of equity investments. The dependent variable, the magnitude of write-downs of equity investments (*WOTA*), is a doubly truncated random variable, which varies between 0 and 1. A common approach to dealing with the problem of censored variables is the tobit model (Tobin, 1958; Maddala, 1983). This model jointly analyses the decision to write-down as well as the decision on the amount of such a write-down (once the decision to write-down has been taken). The change in the expected value of the dependent variable has two components: one effect works by changing the conditional mean of the dependent variable and the other by changing the probability that an observation will be positive.

Table 10 shows the results for the tobit model for the magnitude of write-downs. As for the probability to account write-downs, we start the empirical analysis by analysing the impact of the non-tax variables on the magnitude of write-downs of equity investments. The results presented in column 1 of table 10 largely confirm the evidence provided by the probit model: among the proxies for the investee company's performance only the level of GDP is statistically significant and it affects positively the magnitude of write-downs. Among the proxies for financial reporting costs *LEV, ZSCW* and *SIZE* have the expected signs and result statistically significant, whereas *PROF*, contrary to our expectations, result negatively linked to write-down magnitude.

The debt level weighted according to the ratio equity investments/total assets and the proxy for big bath and income smoothing reporting results significantly and positively linked to write-down magnitude.

The presence of equity investments in foreign companies affects positively and significantly the magnitude of write-downs.

The evidence of a structural break brought about by the 2004 tax reform is quite strong. The marginal tax rate (column 2 of table 10) is statistically insignificant when the regression is run over the 1998-2006 period. In contrast, if we split the fiscal variable into *MTR-PRE* and *MTR-POST* (column 3 of table 10) we find that the marginal tax rate affects positively and significantly the magnitude of write-downs of equity investments in the pre-reform period. Contrary to our expectations the variable *MTR-POST* results statistically significant and negatively linked to *WOTA*, suggesting that tax considerations may have played a role even after the repeal of write-down deductibility, but in a rather puzzling way.

These results are further corroborated by estimation of two stacked regressions reported in table 11. The effect of the fiscal variable on the magnitude of write-downs is statistically significant and positive prior to the implementation of 2004 fiscal reform and becomes negative after the repeal of write-down deductibility.

Finally, the empirical model has been estimated over the full sample using *MTR-PRE* as a proxy for the marginal tax saving brought about by an equity write-down. The regression results (column 4 of table 10) implies that, when equity write-down can be deducted from the tax base, a mean-level unit increase in the marginal tax rate raises the mean-level of equity write-downs by about 1.3%.

8 Concluding remarks

This paper bridges a gap in the existing empirical literature on discretionary write-downs by providing an estimate of the impact of taxes on write-downs of equity investments. The empirical analysis shows that when write-downs are tax deductible (as in the Italian fiscal system prior to the 2004 fiscal reform) the marginal tax rate positively affects both the probability that a firm will write-down equity investments and the magnitude of write-downs. In particular, a mean-level unit increase in the marginal tax rate raises the probability of writing-down by about 7.4%. The impact of

taxes on the magnitude of write downs is weaker: a mean-level unit increase in the tax rate raises the mean-level of equity write-down by only 1.3%.

We also tested for the existence of a trade-off between tax minimization and other motivations for discretionary equity write-downs. We found evidence of an interaction between tax minimization, financial reporting costs and agency costs. Tax motivated write-downs are more likely in more profitable and bigger firms. Tax considerations appear to be salient in small private companies where agency problems are weaker.

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Table 1. **Description and computation of all the variables included in the econometric model**

Variable	***Description***	***Computation***
WO	Dummy variable for writing-down companies	$WO_{it} = \begin{cases} 1 & if \ \left(Write-downs \ of \ equity \ investments\right)_{it} > 0 \\ 0 & if \ \left(Write-downs \ of \ equity \ investments\right)_{it} = 0 \end{cases}$
WOTA	Ratio between write-downs of equity investments and previous year total assets	$WOTA_{it} = \frac{\left(Write-downs \ of \ equity \ investments\right)_{it}}{\left(Total \ assets\right)_{it-1}}$
MTR	Marginal tax rate	*MTR* computed using the Graham (1996a, 1996b, 1999) and Shevlin (1990) methodology
TID	Taxable income dummy	$TID_{it} = \begin{cases} (Top \ statutory \ tax \ rate)_t & if \ (pre \ tax \ and \ write-downs \ of \ equity \ investment \ result)_{it} > 0 \\ 0 & if \ (pre \ tax \ and \ write-downs \ of \ equity \ investment \ result)_{it} \leq 0 \end{cases}$
SM	Trend of stock market	$AZIO_{st} = \frac{\left(Stock \ exchange \ index\right)_{st} - \left(Stock \ exchange \ index\right)_{st-1}}{\left(Stock \ exchange \ index\right)_{st-1}}$
IND_GROWTH	Industry average sales growth	$IND\_GROWTH_{st} = \frac{\left(\text{Sales}\right)_{st} - \left(\text{Sales}\right)_{st-1}}{\left(\text{Sales}\right)_{st-1}}$
LGDP	Industry log of GDP	$LGDP_{st} = \ln\left(\text{GDP}\right)_{st}$
LEV	Debt to equity ratio	$LEV_{it} = \frac{(Debt)_{it}}{(Equity)_{it}}$
LEVW	LEV weighted with the ratio equity investments/ total assets	$LEVW_{it} = LEV_{it} \cdot \frac{(Equity \ Investment)_{it}}{(Total \ Assets)_{it}}$
PROF	EBIT to total assets ratio	$PROF_{it} = \frac{(EBIT)_{it}}{(Total \ Assets)_{it-1}}$
ZSC	Modified Altman's Z-score	$ZSC_{it} = 3.3 \cdot \frac{(EBIT)_{it}}{(Total \ Assets)_{it} + (Write-Downs \ of \ Equity \ Investments)_{it}} + 1.2 \cdot \frac{(Working \ Capital)_{it}}{(Total \ Assets)_{it} + (Write-Downs \ of \ Equity \ Investments)_{it}} + 1.0 \cdot \frac{(Sales)_{it}}{(Total \ Assets)_{it} + (Write-Downs \ of \ Equity \ Investments)_{it}}$
ZSCW	ZSC weighted with the ratio equity investments/ total assets	$ZSCW_{it} = ZSC_{it} \cdot \frac{(Equity \ Investments)_{it}}{(Total \ Assets)_{it}}$

Table 1. **Description and computation of all the variables included in the econometric model** (continued)

CR	Current ratio	$CR_{it} = \frac{(Current\ Assets)_{it}}{(Current\ Liabilities)_{it}}$
TA	Tangible assets with respect to total assets	$TA_{it} = \frac{(Tangible\ Assets)_{it}}{(Total\ Assets)_{it}}$
SIZE	Natural log of sales	$SIZE_{it} = \ln(Sales)_{it-1}$
UI	Unexpected income	$UI_{it} = \frac{(\text{Pre } tax\ and\ write\text{-}downs\ result)_{it} - (\text{Pre } write\text{-}downs\ result)_{it-1}}{(Total\ Assets)_{it-1}}$
BATH	Unusually low pre tax and write-down income	$BATH_{it} = \begin{cases} UI_{it} & if\ UI_{it} < median\ (UI_i)\ computed\ for\ nonzero\ negative\ values \\ 0 & if\ UI_{it} \geq median\ (UI_i)\ computed\ for\ nonzero\ negative\ values \end{cases}$
SMOOTH	Unusually high pre tax and write-down income	$SMOOTH_{it} = \begin{cases} UI_{it} & if\ UI_{it} > median\ (UI_i)\ computed\ for\ nonzero\ positive\ values \\ 0 & if\ UI_{it} \leq median\ (UI_i)\ computed\ for\ nonzero\ positive\ values \end{cases}$
SPC	Dummy variable specifying small private companies	$SPC_{it} = \begin{cases} 1 & if\ the\ company\ is\ small\ private \\ 0 & if\ the\ company\ isn't\ small\ private \end{cases}$
PFC	Dummy variable specifying the presence of equity investments in foreign firms	$SPC_i = \begin{cases} 1 & if\ the\ company\ has\ at\ least\ one\ foreign\ investee\ company\ in\ 2006 \\ 0 & if\ the\ company\ has\ none\ foreign\ investee\ company\ in\ 2006 \end{cases}$

Table 2. **Status of Italian Companies**

Fiscal Year	*Observations*	*Pre tax and pre write-downs income*		*Writing-down companies (share of total)*	
		Positive	*Null or negative*	*All*	*Positive pre tax and pre write-downs income*
1998	4,283	91.71%	8.29%	17.18%	15.76%
1999	4,529	92.05%	7.95%	17.69%	16.43%
2000	4,698	91.27%	8.73%	17.62%	16.35%
2001	4,976	91.54%	8.46%	17.75%	16.28%
2002	5,125	89.17%	10.83%	16.64%	14.69%
2003	5,066	87.82%	12.18%	18.26%	15.85%
2004	5,460	88.28%	11.72%	15.16%	13.30%
2005	5,613	86.42%	13.58%	14.15%	11.92%
2006	5,598	86.71%	13.29%	12.17%	10.56%
Total	**45,348**	**89.27%**	**10.73%**	**16.14%**	**14.40%**

Notes: The second column presents the sample composition for every year during the period 1998-2006. The third and the forth column show for every year the share of company having respectively a positive or null (or negative) value of pre tax and pre write-downs income. The fifth column shows the share (of total) of writing-down companies, whereas the sixth column shows the share (of total) of writing-down companies having positive pre tax and pre write-downs income.
Source: Authors' calculation on AIDA data.

Table 3. **Descriptive Statistics**

Variable		***Mean***	***Std. Dev.***	***Min***	***Max***
Dependent variables	*WO*	0.161	0.368	0	1
	WOTA	0.002	0.011	0	0.394
Fiscal variables	*MTR*	0.317	0.083	0	0.370
	TID	0.313	0.110	0	0.370
Impairment Motive	*SM*	0.040	0.229	-1.709	0.770
	IND_GROWTH	0.064	0.108	-1.420	1.008
	LGDP	10.650	1.054	7.540	12.384
Financial Reporting Costs	*LEV*	0.668	0.199	0	0.998
	LEVW	0.034	0.064	0	0.902
	PROF	0.059	0.077	-0.931	1.973
	ZSC	1.643	0.989	-1.998	17.816
	ZSCW	0.066	0.135	-0.703	5.329
	CR	0.009	0.089	0	4.626
	TA	0.185	0.159	0	0.999
	SIZE	9.914	1.149	0.693	15.680
	BATH	-0.010	0.035	-0.931	0
	SMOOTH	0.017	0.055	0	1.828
Agency Relationship	*SPC*	0.198	0.399	0	1
	PFC	0.358	0.479	0	1

Notes: Values expressed in thousands of euro. Years: 1998-2006. 45,348 observations. *WO* is the dummy variable indicating writing-off companies; *WOTA* is the ratio between write-downs of equity investments and total assets of previous year; *MTR* is the marginal tax rate computed using the Graham-Shevlin methodology; *TID* is the alternative marginal tax rate; *SM* is the trend of stock market; *IND_GROWTH* is the industry average sales growth; *LGDP* is the industry log of GDP; *LEV* is the debt to equity ratio; *LEVW* is equal to *LEV* weighted according to the ratio equity investments/total assets; *PROF* is the EBIT to total assets ratio; *ZSC* is the modified Altman's Z-score; *ZSCW* is the *ZCS* weighted according to the ratio equity investments/total assets; *CR* is the current ratio; *TA* is the share of tangible assets on total assets; *SIZE* is the log of sales; *BATH* and *SMOOTH* show respectively unusually low and high pre tax and pre write-downs income; *SPC* and *PFC* show respectively small private companies and the presence of equity in foreign companies. Table 1 provides the computation of all the variables.
Sources: AIDA, Banca d'Italia, ISTAT.

Table 4. **Summary Statistics for Economic Sectors**

Economic sectors	*Obs.*	*Share in Sample*	*Mean WO*	*Mean WOTA*	*Mean MTR*	*Mean TID*
Mining and quarrying*	253	0.56%	0.130	0.002	0.333	0.333
Manufacturing*						
*Food products, beverages and tobacco***	2,537	5.59%	0.134	0.001	0.305	0.307
*Textiles***	2,311	5.10%	0.167	0.002	0.301	0.293
*Tannery***	1,066	2.35%	0.098	0.001	0.299	0.299
*Wood products***	364	0.80%	0.137	0.001	0.334	0.333
*Paper; printing and publishing***	1,292	2.85%	0.189	0.003	0.311	0.304
*Coke, petroleum refinery***	117	0.26%	0.248	0.007	0.324	0.309
*Chemical products***	1,532	3.38%	0.206	0.003	0.311	0.306
*Non-metallic mineral products***	1,679	3.70%	0.190	0.002	0.318	0.313
*Metallurgy***	884	1.95%	0.136	0.002	0.325	0.317
*Metals***	3,939	8.69%	0.120	0.001	0.324	0.320
*Machinery and equipment***	3,087	6.81%	0.162	0.002	0.322	0.317
*Production of electric, electronic and optical machinery***	1,688	3.72%	0.196	0.003	0.312	0.307
*Transports, storage and communication***	628	1.38%	0.162	0.003	0.299	0.293
*Other manufacturing industries***	1,573	3.47%	0.114	0.001	0.307	0.301
Electricity, gas and water supply*	200	0.44%	0.285	0.002	0.315	0.318
Construction*	3,656	8.06%	0.260	0.002	0.329	0.326
Wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods*	11,006	24.27%	0.101	0.001	0.318	0.314
Hotels and restaurants*	331	0.73%	0.257	0.002	0.310	0.301
Transport, storage and communication*	2,364	5.21%	0.208	0.002	0.321	0.315
Financial intermediation*	399	0.88%	0.358	0.009	0.321	0.317
Real estate, renting and business activities*	3,153	6.95%	0.235	0.004	0.317	0.313
Social security*	9	0.02%	0.556	0.001	0.331	0.351
Education*	24	0.05%	0.083	0.000	0.327	0.350
Health and social work*	639	1.41%	0.160	0.003	0.336	0.332
Other community, social and personal service activities*	617	1.36%	0.190	0.002	0.299	0.297

Notes: Years: 1998–2006. 45,348 observations. *WO* is the dummy variable indicating writing-off companies; *WOTA* is the ratio between write-downs of equity investments and total assets of previous year; *MTR* is the marginal tax rate computed using the Graham-Shevlin methodology; *TID* is the alternative marginal tax rate. Table 1 provides the computation of all the variables.
Source: authors' calculation on AIDA, Banca d'Italia and ISTAT data.
*: Economic activities identified by 4-digit ATECO2002 code; **: Economic activities identified by 5-digit ATECO2002 code.

Table 5: **Cross-correlation**

	MTR	*TID*	*SM*	*IND_GRO*	*LGDP*	*LEV*	*LEVW*	*PROF*	*ZSC*
MTR	1								
TID	0.870	1							
SM	-0.040	-0.037	1						
IND-GRO	0.031	0.022	0.029	1					
LGDP	0.033	0.023	0.061	0.019	1				
LEV	-0.069	-0.059	-0.018	0.042	0.165	1			
LEVW	-0.020	-0.028	0.016	-0.013	0.028	0.024	1		
PROF	0.396	0.361	-0.005	0.002	-0.032	-0.212	-0.069	1	
ZSC	0.187	0.164	-0.059	0.031	0.184	-0.012	-0.245	0.361	1
ZSCW	0.074	0.064	-0.005	0.009	0.026	-0.141	0.496	0.137	0.194
CR	0.000	-0.003	0.007	-0.007	0.012	-0.076	0.052	-0.017	-0.057
TA	-0.065	-0.055	-0.031	0.026	-0.155	-0.197	-0.104	-0.031	-0.246
SIZE	-0.011	-0.007	-0.043	-0.031	-0.046	0.045	-0.007	0.003	0.164
BATH	0.037	0.028	0.041	-0.019	-0.139	-0.066	0.161	0.037	-0.147
SMOOTH	0.209	0.228	-0.009	0.020	0.010	0.104	-0.030	0.154	0.062
SPC	0.003	-0.005	-0.008	0.017	0.151	0.042	0.011	-0.034	0.137
PFC	0.022	0.058	0.022	-0.020	0.004	-0.109	0.066	0.319	0.043

	ZSCP	*CR*	*TA*	*SIZE*	*BATH*	*SMOOTH*	*SPC*	*PFC*
ZSCW	1							
CR	0.014	1						
TA	-0.109	-0.025	1					
SIZE	0.113	-0.020	-0.051	1				
BATH	0.087	0.032	-0.054	0.226	1			
SMOOTH	0.001	-0.012	-0.012	0.011	0.001	1		
SPC	0.002	-0.002	-0.061	-0.412	-0.178	-0.013	1	
PFC	0.091	0.026	-0.029	-0.028	0.031	0.086	-0.012	1

Notes: *MTR* is the marginal tax rate computed using the Graham-Shevlin methodology; *TID* is the alternative marginal tax rate; *SM* is the trend of stock market; *IND_GROWTH* is the industry average sales growth; *LGDP* is the industry log of GDP; *LEV* is the debt to equity ratio; *LEVW* is equal to *LEV* weighted according to the ratio equity investments/total assets; *PROF* is the EBIT to total assets ratio; *ZSC* is the modified Altman's Z-score; *ZSCW* is the *ZCS* weighted according to the ratio equity investments/total assets; *CR* is the current ratio; *TA* is the share of tangible assets on total assets; *SIZE* is the log of sales; *BATH* and *SMOOTH* show respectively unusually low and high pre tax and pre write-downs income; *SPC* and *PFC* show respectively small private companies and the presence of equity in foreign companies. Table 1 provides the computation of all the variables.

Table 6. **Determinants of the write-down decision:** marginal effects estimated using the probit RE models with yearly dummies

Independent Variables		***Expected Signs***	**1**	**2**	**3**	**4**
Fiscal variable	*MTR*	?		0.019		
				(0.019)		
	MTR-PRE	+			0.065**	0.074***
					(0.023)	(0.023)
	MTR-POST	N.S.S.			-0.040	
					(0.025)	
Impairment Motive	*SM*	-	0.011	0.011	0.010	0.010
			(0.007)	(0.007)	(0.007)	(0.007)
	IND-GRO	?	0.014	0.014	0.014	0.014
			(0.011)	(0.011)	(0.011)	(0.011)
	LGDP	?	0.013***	0.013***	0.013***	0.013***
			(0.002)	(0.002)	(0.002)	(0.002)
Financial Reporting Costs	*LEV*	-	-0.074***	-0.073***	-0.074***	-0.073***
			(0.010)	(0.010)	(0.010)	(0.010)
	LEVW	?	0.262***	0.262***	0.259***	0.260***
			(0.028)	(0.028)	(0.028)	(0.028)
	PROF	+	-0.024	-0.030	-0.031	-0.038*
			(0.022)	(0.023)	(0.023)	(0.022)
	ZSC	+	-0.040***	-0.040***	-0.040***	-0.040***
			(0.003)	(0.003)	(0.003)	(0.003)
	ZSCW	+	0.085***	0.085***	0.086***	0.086***
			(0.013)	(0.013)	(0.013)	(0.013)
	CR	+	0.034**	0.034**	0.034**	0.034**
			(0.012)	(0.012)	(0.012)	(0.012)
	TA	+	-0.070***	-0.069***	-0.069***	-0.069***
			(0.012)	(0.012)	(0.012)	(0.012)
	SIZE	+	0.034***	0.034***	0.035***	0.035***
			(0.002)	(0.002)	(0.002)	(0.002)
	BATH	?	0.199***	0.193***	0.192***	0.185***
			(0.036)	(0.036)	(0.036)	(0.036)
	SMOOTH	+	0.107***	0.109***	0.108***	0.111***
			(0.020)	(0.020)	(0.020)	(0.020)

Table 6. **Determinants of the write-down decision:** marginal effects estimated using the probit RE models with yearly dummies (continued)

Agency Relationship	*SPC*	+	0.005	0.005	0.005	0.005
			(0.005)	(0.005)	(0.005)	(0.005)
	PFC	+	0.071***	0.071***	0.071***	0.071***
			(0.006)	(0.006)	(0.006)	(0.006)
Yearly dummies			YES	YES	YES	YES
Obs			45,348	45,348	45,348	45,348
Nagelkerke Pseudo-R2			0.0703	0.0704	0.0709	0.0708

Notes: the marginal effects are estimated using the probit regression where *WO* is the dummy variable showing writing-down companies; *MTR* is the marginal tax rate computed using the Graham-Shevlin methodology; *MTR-PRE* is equal to *MTR* up to 2003 and zero otherwise; *MTR-POST* is equal to *MTR* from 2004 on and is zero otherwise; *SM* is the trend of stock market; *IND_GROWTH* is the industry average sales growth; *LGDP* is the industry log of GDP; *LEV* is the debt to equity ratio; *LEVW* is equal to *LEV* weighted according to the ratio equity investments/total assets; *PROF* is the EBIT to total assets ratio; *ZSC* is the modified Altman's Z-score; *ZSCW* is the *ZCS* weighted according to the ratio equity investments/total assets; *CR* is the current ratio; *TA* is the share of tangible assets on total assets; *SIZE* is the log of sales; *BATH* and *SMOOTH* show respectively unusually low and high pre tax and pre write-downs income; *SPC* and *PFC* show respectively small private companies and the presence of equity in foreign companies; *D1998-D2006* are yearly dummies. Table 1 provides the computation of all the variables. In regression 1 we exclude the fiscal variable from the model; in 2 we add the *MTR* to the independent variables; in 3 we split the fiscal variable in *MTR-PRE* and *MTR-POST* reform; in 4 we insert as fiscal variable *MTR-PRE*. Estimated regressions are:

$$WO_{it} = \alpha_0 + \alpha_1 SM_{st} + \alpha_2 IND\_GROWTH_{st} + \alpha_3 LGDP_{st} + \alpha_4 LEV_{it} + \alpha_5 LEVW_{it} + \alpha_6 PROF_{it} + \alpha_7 ZSC_{it} + \alpha_8 ZSCW_{it} + \alpha_9 CR_{it}$$
$$+ \alpha_{10} TA_{it\,it} + \alpha_{11} SIZE + \alpha_{12} BATH_{it} + \alpha_{13} SMOOTH_{it} + \alpha_{14} SPC_{it} + \alpha_{15} PFC_i + D1998 + D1999 + D2000 + D2001 + D2002 + D2003 + D2004 + D2005 + D2006 + \varepsilon_{it}$$

$$WO_{it} = \alpha_0 + \alpha_1 MTR_{it} + \alpha_2 SM_{st} + \alpha_3 IND\_GROWTH_{st} + \alpha_4 LGDP_{st} + \alpha_5 LEV_{it} + \alpha_6 LEVW_{it} + \alpha_7 PROF_{it} + \alpha_8 ZSC_{it} + \alpha_9 ZSCW_{it} + \alpha_{10} CR_{it}$$
$$+ \alpha_{11} TA_{it} + \alpha_{12} SIZE_{it} + \alpha_{13} BATH_{it} + \alpha_{14} SMOOTH_{it} + \alpha_{15} SPC_{it} + \alpha_{16} PFC_i + D1998 + D1999 + D2000 + D2001 + D2002 + D2003 + D2004 + D2005 + D2006 + \varepsilon_{it}$$

$$WO_{it} = \alpha_0 + \alpha_1 MTR - PRE_{it} + \alpha_2 MTR - POST_{it} + \alpha_3 SM_{st} + \alpha_4 IND\_GROWTH_{st} + \alpha_5 LGDP_{st} + \alpha_6 LEV_{it} + \alpha_7 LEVW_{it} + \alpha_8 PROF_{it} + \alpha_9 ZSC_{it} + \alpha_{10} ZSCW_{it} + \alpha_{11} CR_{it}$$
$$+ \alpha_{12} TA_{it} + \alpha_{13} SIZE_{it} + \alpha_{14} BATH_{it} + \alpha_{15} SMOOTH_{it} + \alpha_{16} SPC_{it} + \alpha_{17} PFC_i + D1998 + D1999 + D2000 + D2001 + D2002 + D2003 + D2004 + D2005 + D2006 + \varepsilon_{it}$$

$$WO_{it} = \alpha_0 + \alpha_1 MTR - PRE_{it} + \alpha_2 SM_{st} + \alpha_3 IND\_GROWTH_{st} + \alpha_4 LGDP_{st} + \alpha_5 LEV_{it} + \alpha_6 LEVW_{it} + \alpha_7 PROF_{it} + \alpha_8 ZSC_{it} + \alpha_9 ZSCW_{it} + \alpha_{10} CR_{it}$$
$$+ \alpha_{11} TA_{it} + \alpha_{12} SIZE_{it} + \alpha_{13} BATH_{it} + \alpha_{14} SMOOTH_{it} + \alpha_{15} SPC_{it} + \alpha_{16} PFC_i + D1998 + D1999 + D2000 + D2001 + D2002 + D2003 + D2004 + D2005 + D2006 + \varepsilon_{it}$$

Robust standard errors in parentheses. Superscript asterisks indicate statistical significance at 0.01 (***), 0.05 (**) and 0.10 (*).

Table 7. **Determinants of the write-down decision:** Differences across fiscal regimes

Independent Variables		*Expected Signs*	Pre 2004 Fiscal reform	Post 2004 Fiscal reform	Differences across fiscal regimes
Fisacl variable	*MTR*	?	0.068**	-0.035	0.103**
			(0.024)	(0.027)	
Impairment Motive	*SM*	-	0.009	0.028	-0.020
			(0.007)	(0.018)	
	IND-GRO	?	0.020*	-0.034	0.055
			(0.011)	(0.035)	
	LGDP	?	0.013***	0.012***	0.001
			(0.002)	(0.003)	
Financial Reporting Costs	*LEV*	-	-0.078***	-0.067***	-0.011
			(0.011)	(0.013)	
	LEVW	?	0.273***	0.244***	0.028
			(0.033)	(0.038)	
	PROF	+	-0.023	-0.054	0.032
			(0.027)	(0.037)	
	ZSC	+	-0.042***	-0.035***	-0.007*
			(0.003)	(0.004)	
	ZSCW	+	0.087***	0.080***	0.007
			(0.015)	(0.020)	
	CR	+	0.044**	0.025	0.019
			(0.017)	(0.016)	
	TA	+	-0.082***	-0.048**	-0.034*
			(0.014)	(0.016)	
	SIZE	+	0.039***	0.028***	0.010***
			(0.002)	(0.002)	
	BATH	?	0.159***	0.237***	-0.078
			(0.046)	(0.060)	
	SMOOTH	+	0.132***	0.074**	0.058
			(0.027)	(0.031)	
Agency Relationship	*SPC*	+	0.010	-0.002	0.011
			(0.006)	(0.007)	
	PFC	+	0.078***	0.083***	-0.005
			(0.007)	(0.009)	
Yearly dummies				YES	
Obs				45,348	
Nagelkerke Pseudo-R2				0.0725	

Notes: the marginal effects are estimated using the probit regression where *WO* is the dummy variable showing writing-down companies; *MTR* is the marginal tax rate computed using the Graham-Shevlin methodology; *SM* is the trend of stock market; *IND_GROWTH* is the industry average sales growth; *LGDP* is the industry log of GDP; *LEV* is the debt to equity ratio; *LEVW* is equal to *LEV* weighted according to the ratio equity investments/total assets; *PROF* is the EBIT to total assets ratio; *ZSC* is the modified Altman's Z-score; *ZSCW* is the *ZCS* weighted according to the ratio equity investments/total assets; *CR* is the current ratio; *TA* is the share of tangible assets on total assets; *SIZE* is the log of sales; *BATH* and *SMOOTH* show respectively unusually low and high pre tax and pre write-downs income; *SPC* and *PFC* show respectively small private companies and the presence of equity in foreign companies; *D1998-D2006* are yearly dummies. Table 1 provides the computation of all the variables. Estimated regression is:

$$WO_{it} = PRE \cdot \begin{bmatrix} \alpha_0 + \alpha_1 MTR_{it} + \alpha_2 SM_{st} + \alpha_3 IND\_GROWTH_{st} + \alpha_4 LGDP_{st} + \alpha_5 LEV_{it} + \alpha_6 LEVW_{it} + \alpha_7 PROF_{it} + \alpha_8 ZSC_{it} \\ + \alpha_9 ZSCW_{it} + \alpha_{10} CR_{it} + \alpha_{11} TA_{it} + \alpha_{12} SIZE_{it} + \alpha_{13} BATH_{it} + \alpha_{14} SMOOTH_{it} + \alpha_{15} SPC_{it} + \alpha_{16} PFC_i \end{bmatrix}$$
$$+ POST \cdot \begin{bmatrix} \beta_0 + \beta_1 MTR_{it} + \beta_2 SM_{st} + \beta_3 IND\_GROWTH_{st} + \beta_4 LGDP_{st} + \beta_5 LEV_{it} + \beta_6 LEVW_{it} + \beta_7 PROF_{it} + \beta_8 ZSC_{it} \\ + \beta_9 ZSCW_{it} + \beta_{10} CR_{it} + \beta_{11} TA_{it} + \beta_{12} SIZE_{it} + \beta_{13} BATH_{it} + \beta_{14} SMOOTH_{it} + \beta_{15} SPC_{it} + \beta_{16} PFC_i \end{bmatrix}$$
$$+ D1998 + D1999 + D2000 + D2001 + D2002 + D2003 + D2004 + D2005 + D2006 + \varepsilon_{it}$$

Robust standard errors in parentheses. Superscript asterisks indicate statistical significance at 0.01 (***), 0.05 (**) and 0.10 (*).

Table 8. **Robustness:** Marginal effects estimated using the probit RE model with yearly dummies

Independent Variables		***Expected Signs***	**1**	**2**	**3**	**4**	**5**
Fiscal Variables	*MTR-PRE*	+	0.167***		0.113***	0.048**	0.061**
			(0.055)		(0.034)	(0.019)	(0.023)
	MTR-POST	N.S.S.	-0.061		-0.005	-0.004	-0.034
			(0.060)		(0.034)	(0.020)	(0.025)
	TID-PRE	+		0.034**			
				(0.015)			
	TID-POST	N.S.S.		-0.033*			
				(0.019)			
Impairment Motive	*SM*	-	0.012*	0.011	0.008	0.011**	0.013*
			(0.007)	(0.007)	(0.008)	(0.006)	(0.006)
	IND-GRO	?	0.006	0.014	0.031	0.019**	0.016
			(0.011)	(0.011)	(0.014)	(0.009)	(0.010)
	LGDP	?	0.014***	0.013***	0.006**	0.008***	0.012***
			(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Financial Reporting Costs	*LEV*	-	-0.079***	-0.074***	-0.048**	-0.035***	-0.059***
			(0.010)	(0.010)	(0.012)	(0.008)	(0.009)
	LEVW	?	0.230***	0.259***	0.110***	0.157***	0.252***
			(0.031)	(0.028)	(0.029)	(0.024)	(0.027)
	PROF	+	-0.006	-0.027	0.001	-0.025	-0.028
			(0.024)	(0.023)	(0.030)	(0.019)	(0.022)
	ZSC	+	-0.044***	-0.040***	-0.022***	-0.022***	-0.037***
			(0.003)	(0.003)	(0.003)	(0.002)	(0.003)
	ZSCW	+	0.094***	0.086***	0.044***	0.050***	0.080***
			(0.014)	(0.013)	(0.014)	(0.010)	(0.013)
	CR	+	0.028**	0.034**	0.036**	0.028**	0.041**
			(0.013)	(0.012)	(0.015)	(0.011)	(0.015)
	TA	+	-0.072***	-0.070***	-0.043**	-0.028**	-0.059***
			(0.013)	(0.012)	(0.014)	(0.009)	(0.012)
	SIZE	+	0.036***	0.035***	0.008**	0.017***	0.033***
			(0.002)	(0.002)	(0.003)	(0.002)	(0.002)
	BATH	?	0.254***	0.196***	0.044	0.099***	0.165***
			(0.047)	(0.036)	(0.040)	(0.031)	(0.036)
	SMOOTH	+	0.105***	0.107***	0.056**	0.078***	0.108***
			(0.021)	(0.020)	(0.025)	(0.017)	(0.020)

Table 8. **Robustness:** Marginal effects estimated using the probit RE model with yearly dummies (continued)

Agency Relationship	*SPC*	+	0.010*	0.005		0.003	0.005
			(0.006)	(0.005)		(0.004)	(0.005)
	PFC	+	0.068***	0.071***	0.023**		0.066***
			(0.006)	(0.006)	(0.009)		(0.006)
Yearly dummies			YES	YES	YES	YES	YES
Obs.			40,484	45,348	8,979	29,114	44,635
Nagelkerke Pseudo-R2			0.076	0.071	0.062	0.040	0.064

Notes: the marginal effects are estimated using the probit regression where *WO* is the dummy variable showing writing-down companies; *MTR* is the marginal tax rate computed using the Graham-Shevlin methodology: *MTR-PRE* is equal to *MTR* up to 2003 and zero otherwise; *MTR-POST* is equal to *MTR* from 2004 on and is zero otherwise; *TID* is the alternative marginal tax rate: *TID -PRE* is equal to *TID* up to 2003 and zero otherwise; *TID -POST* is equal to *TID* from 2004 on and is zero otherwise; *SM* is the trend of stock market; *IND_GROWTH* is the industry average sales growth; *LGDP* is the industry log of GDP; *LEV* is the debt to equity ratio; *LEVW* is equal to *LEV* weighted according to the ratio equity investments/total assets; *PROF* is the EBIT to total assets ratio; *ZSC* is the modified Altman's Z-score; *ZSCW* is the *ZCS* weighted according to the ratio equity investments/total assets; *CR* is the current ratio; *TA* is the share of tangible assets on total assets; *SIZE* is the log of sales; *BATH* and *SMOOTH* show respectively unusually low and high pre tax and pre write-downs income; *SPC* and *PFC* show respectively small private companies and the presence of equity in foreign companies; *D1998-D2006* are yearly dummies. Table 1 provides the computation of all the variables. Regression 1 is limited to companies having positive income before taxes and write-downs; in regression 2 we insert as fiscal variable *TID*, the alternative marginal tax rate; regression 3 is limited to small private companies; in regressions 4 and 5 the sample is restricted respectively to firms with no foreign participations and to no listed companies. Estimated regression in column 1, 3, 4 and 5 is:

$$WO_{it} = \alpha_0 + \alpha_1 MTR - PRE_{it} + \alpha_2 MTR - POST_{it} + \alpha_3 SM_{st} + \alpha_4 IND\_GROWTH_{st} + \alpha_5 LGDP_{st} + \alpha_6 LEV_{it} + \alpha_7 LEVW_{it} + \alpha_8 PROF_{it} + \alpha_9 ZSC_{it} + \alpha_{10} ZSCW_{it} + \alpha_{11} CR_{it}$$
$$+ \alpha_{12} TA_{it} + \alpha_{13} SIZE_{it} + \alpha_{14} BATH_{it} + \alpha_{15} SMOOTH_{it} + \alpha_{16} SPC_{it} + \alpha_{17} PFC_i + D1998 + D1999 + D2000 + D2001 + D2002 + D2003 + D2004 + D2005 + D2006 + \varepsilon_{it}$$

Estimated regression in column 2 is:

$$WO_{it} = \alpha_0 + \alpha_1 TID - PRE_{it} + \alpha_2 TID - POST_{it} + \alpha_3 SM_{st} + \alpha_4 IND\_GROWTH_{st} + \alpha_5 LGDP_{st} + \alpha_6 LEV_{it} + \alpha_7 LEVW_{it} + \alpha_8 PROF_{it} + \alpha_9 ZSC_{it} + \alpha_{10} ZSCW_{it} + \alpha_{11} CR_{it}$$
$$+ \alpha_{12} TA_{it} + \alpha_{13} SIZE_{it} + \alpha_{14} BATH_{it} + \alpha_{15} SMOOTH_{it} + \alpha_{16} SPC_{it} + \alpha_{17} PFC_i + D1998 + D1999 + D2000 + D2001 + D2002 + D2003 + D2004 + D2005 + D2006 + \varepsilon_{it}$$

Robust standard errors in parentheses. Superscript asterisks indicate statistical significance at 0.01 (***), 0.05 (**) and 0.10 (*).

Table 9. **Regression with Interaction Terms:** Marginal effects estimated using the probit RE model with yearly dummies.

Independent Variables		*Expected Signs*	*Marginal Effects*	*Robust Standard Errors*
Fiscal Variables	*MTR-PRE*	+	-0.242**	(0.104)
	MTR-POST	N.S.S.	-0.023	(0.027)
Impairment Motive	*SM*	-	0.022	(0.015)
	IND-GRO	?	0.005	(0.028)
	LGDP	?	0.013***	(0.002)
Financial Reporting Costs	*LEV*	-	-0.067***	(0.012)
	LEVW	?	0.251***	(0.036)
	PROF	+	-0.082**	(0.035)
	ZSC	+	-0.032***	(0.004)
	ZSCW	+	0.076***	(0.019)
	CR	+	0.031**	(0.016)
	TA	+	-0.048**	(0.016)
	SIZE	+	0.027***	(0.002)
	BATH	?	0.165**	(0.050)
	SMOOTH	+	0.067**	(0.030)
Agency Relationship	*SPC*	+	-0.009	(0.007)
	PFC	+	0.073***	(0.007)
Interaction Terms	*MTR-PRE*SM*	?	-0.036	(0.045)
	*MTR-PRE*IND-GRO*	+	0.036	(0.088)
	*MTR-PRE*LGDP*	+	0.002	(0.007)
	*MTR-PRE*LEV*	?	-0.042	(0.037)
	*MTR-PRE*LEVW*	?	0.063	(0.122)
	*MTR-PRE*PROF*	+	0.207*	(0.118)
	*MTR-PRE*ZSC*	+	-0.034**	(0.011)
	*MTR-PRE*ZSCW*	+	0.033	(0.062)
	*MTR-PRE*CR*	+	0.014	(0.067)
	*MTR-PRE*TA*	+	-0.104**	(0.049)
	*MTR-PRE*SIZE*	+	0.036***	(0.007)
	*MTR-PRE*BATH*	?	0.196	(0.221)
	*MTR-PRE*SMOOTH*	+	0.209*	(0.118)
	*MTR-PRE*SPC*	+	0.065**	(0.022)
	*MTR-PRE*PFC*	+	-0.008	(0.015)
Yearly dummies			YES	
Obs.			45,348	
Nagelkerke Pseudo-R2			0.073	

Notes: the marginal effects are estimated using the probit regression where *WO* is the dummy variable showing writing-down companies; *MTR* is the marginal tax rate computed using the Graham-Shevlin methodology; *MTR-PRE* is equal to *MTR* up to 2003 and zero otherwise; *MTR-POST* is equal to *MTR* from 2004 on and is zero otherwise; *SM* is the trend of stock market; *IND_GROWTH* is the industry average sales growth; *LGDP* is the industry log of GDP; *LEV* is the debt to equity ratio; *LEVW* is equal to *LEV* weighted according to the ratio equity investments/total assets; *PROF* is the EBIT to total assets ratio; *ZSC* is the modified Altman's Z-score; *ZSCW* is the *ZCS* weighted according to the ratio equity investments/total assets; *CR* is the current ratio; *TA* is the share of tangible assets on total assets; *SIZE* is the log of sales; *BATH* and *SMOOTH* show respectively unusually low and high pre tax and pre write-downs income; *SPC* and *PFC* show respectively small private companies and the presence of equity in foreign companies; *D1998-D2006* are yearly dummies. Table 1 provides the computation of all the variables. Estimated regression, containing the interaction terms among the *MTR-PRE* and all the remaining independent variables, is:

$$WO_{it} = \alpha_0 + \alpha_1 MTR - PRE_{it} + \alpha_2 MTR - POST_{it} + \alpha_3 SM_{st} + \alpha_4 IND\_GROWTH_{st} + \alpha_5 LGDP_{st} + \alpha_6 LEV_{it} + \alpha_7 LEVW_{it}$$
$$+ \alpha_8 PROF_{it} + \alpha_9 ZSC_{it} + \alpha_{10} ZSCW_{it} + \alpha_{11} CR_{it} + \alpha_{12} TA_{it} + \alpha_{13} SIZE_{it} + \alpha_{14} BATH_{it} + \alpha_{15} SMOOTH_{it} + \alpha_{16} SPC_{it} + \alpha_{17} PFC_i$$
$$+ \beta_1 (MTR - PRE_{it} \times SM_{st}) + \beta_2 (MTR - PRE_{it} \times IND\_GROWTH_{st}) + \beta_3 (MTR - PRE_{it} \times LGDP_{st}) + \beta_4 (MTR - PRE_{it} \times LEV_{it})$$
$$+ \beta_5 (MTR - PRE_{it} \times LEVW_{it}) + \beta_6 (MTR - PRE_{it} \times PROF_{it}) + \beta_7 (MTR - PRE_{it} \times ZSC_{it}) + \beta_8 (MTR - PRE_{it} \times ZSCW_{it})$$
$$+ \beta_9 (MTR - PRE_{it} \times CR_{it}) + \beta_{10} (MTR - PRE_{it} \times TA_{it}) + \beta_{11} (MTR - PRE_{it} \times SIZE_{it}) + \beta_{12} (MTR - PRE_{it} \times BATH_{it})$$
$$+ \beta_{13} (MTR - PRE_{it} \times SMOOTH_{it}) + \beta_{14} (MTR - PRE_{it} \times SPC_{it}) + \beta_{15} (MTR - PRE_{it} \times PFC_i)$$
$$+ D1998 + D1999 + D2000 + D2001 + D2002 + D2003 + D2004 + D2005 + D2006 + \varepsilon_{it}$$

Superscript asterisks indicate statistical significance at 0.01 (***), 0.05 (**) and 0.10 (*) levels.

Table 10. **Determinants of write-down magnitude:** marginal effects estimated using the tobit RE model with yearly dummies

Independent Variables		*Expected Signs*	1	2	3	4
Fisacl variable	*MTR*	?		0.001		
				(0.004)		
	MTR-PRE	+			0.011**	0.013**
					(0.004)	(0.004)
	MTR-POST	N.S.S.			-0.013**	
					(0.005)	
Impairment Motive	*SM*	-	0.001	0.001	0.001	0.001
			(0.001)	(0.001)	(0.001)	(0.001)
	IND-GRO	?	0.001	0.001	0.001	0.001
			(0.002)	(0.002)	(0.002)	(0.002)
	LGDP	?	0.002***	0.002***	0.002***	0.002***
			(0.000)	(0.000)	(0.000)	(0.001)
Financial Reporting Costs	*LEV*	-	-0.014***	-0.014***	-0.014***	-0.014***
			(0.002)	(0.002)	(0.002)	(0.002)
	LEVW	?	0.102***	0.102***	0.101***	0.101***
			(0.005)	(0.005)	(0.005)	(0.005)
	PROF	+	-0.007*	-0.007*	-0.007*	-0.009**
			(0.004)	(0.004)	(0.004)	(0.004)
	ZSC	+	-0.007***	-0.007***	-0.007***	-0.007***
			(0.000)	(0.000)	(0.000)	(0.001)
	ZSCW	+	0.013***	0.013***	0.013***	0.013***
			(0.002)	(0.002)	(0.002)	(0.002)
	CR	+	0.004**	0.004**	0.005**	0.004**
			(0.002)	(0.002)	(0.002)	(0.002)
	TA	+	-0.011***	-0.011***	-0.011***	-0.011***
			(0.002)	(0.002)	(0.002)	(0.002)
	SIZE	+	0.005***	0.005***	0.005***	0.005***
			(0.000)	(0.000)	(0.000)	(0.001)
	BATH	?	0.034***	0.034***	0.034***	0.032***
			(0.007)	(0.007)	(0.007)	(0.007)
	SMOOTH	+	0.040***	0.040***	0.040***	0.040***
			(0.003)	(0.004)	(0.004)	(0.003)

Table 10. **Determinants of write-down magnitude:** marginal effects estimated using the tobit RE model with yearly dummies (continued)

Agency Relationship	*SPC*	+	0.001	0.001	0.001	0.001
			(0.001)	(0.001)	(0.001)	(0.001)
			(0.003)	(0.004)	(0.004)	(0.003)
	PFC	+	0.011***	0.011***	0.011***	0.011***
			(0.001)	(0.001)	(0.001)	(0.001)
Yearly dummies			YES	YES	YES	YES
Obs			45,348	45,348	45,348	45,348
Cox & Snell Pseudo-R2			0.1209	0.1209	0.1212	0.1211

Notes: the marginal effects are estimated using the tobit regression where *WOTA* is the ratio between write-downs of equity investments and previous year total assets; *MTR* is the marginal tax rate computed using the Graham-Shevlin methodology; *MTR-PRE* is equal to *MTR* up to 2003 and zero otherwise; *MTR-POST* is equal to *MTR* from 2004 on and is zero otherwise; *SM* is the trend of stock market; *IND_GROWTH* is the industry average sales growth; *LGDP* is the industry log of GDP; *LEV* is the debt to equity ratio; *LEVW* is equal to *LEV* weighted according to the ratio equity investments/total assets; *PROF* is the EBIT to total assets ratio; *ZSC* is the modified Altman's Z-score; *ZSCW* is the *ZCS* weighted according to the ratio equity investments/total assets; *CR* is the current ratio; *TA* is the share of tangible assets on total assets; *SIZE* is the log of sales; *BATH* and *SMOOTH* show respectively unusually low and high pre tax and pre write-downs income; *SPC* and *PFC* show respectively small private companies and the presence of equity in foreign companies; *D1998-D2006* are yearly dummies. Table 1 provides the computation of all the variables. In regression 1 we exclude the fiscal variable from the model; in 2 we add the *MTR* to the independent variables; in 3 we split the fiscal variable in *MTR-PRE* and *MTR-POST* reform; in 4 we insert as fiscal variable *MTR-PRE*. Estimated regressions are:

$$WOTA_{it} = \alpha_0 + \alpha_1 SM_{st} + \alpha_2 IND\_GROWTH_{st} + \alpha_3 LGDP_{st} + \alpha_4 LEV_{it} + \alpha_5 LEVW_{it} + \alpha_6 PROF_{it} + \alpha_7 ZSC_{it} + \alpha_8 ZSCW_{it} + \alpha_9 CR_{it}$$
$$+ \alpha_{10} TA_{it\,it} + \alpha_{11} SIZE + \alpha_{12} BATH_{it} + \alpha_{13} SMOOTH_{it} + \alpha_{14} SPC_{it} + \alpha_{15} PFC_i + D1998 + D1999 + D2000 + D2001 + D2002 + D2003 + D2004 + D2005 + D2006 + \varepsilon_{it}$$

$$WOTA_{it} = \alpha_0 + \alpha_1 MTR_{it} + \alpha_2 SM_{st} + \alpha_3 IND\_GROWTH_{st} + \alpha_4 LGDP_{st} + \alpha_5 LEV_{it} + \alpha_6 LEVW_{it} + \alpha_7 PROF_{it} + \alpha_8 ZSC_{it} + \alpha_9 ZSCW_{it} + \alpha_{10} CR_{it}$$
$$+ \alpha_{11} TA_{it} + \alpha_{12} SIZE_{it} + \alpha_{13} BATH_{it} + \alpha_{14} SMOOTH_{it} + \alpha_{15} SPC_{it} + \alpha_{16} PFC_i + D1998 + D1999 + D2000 + D2001 + D2002 + D2003 + D2004 + D2005 + D2006 + \varepsilon_{it}$$

$$WOTA_{it} = \alpha_0 + \alpha_1 MTR - PRE_{it} + \alpha_2 MTR - POST_{it} + \alpha_3 SM_{st} + \alpha_4 IND\_GROWTH_{st} + \alpha_5 LGDP_{st} + \alpha_6 LEV_{it} + \alpha_7 LEVW_{it} + \alpha_8 PROF_{it} + \alpha_9 ZSC_{it} + \alpha_{10} ZSCW_{it} + \alpha_{11} CR_{it}$$
$$+ \alpha_{12} TA_{it} + \alpha_{13} SIZE_{it} + \alpha_{14} BATH_{it} + \alpha_{15} SMOOTH_{it} + \alpha_{16} SPC_{it} + \alpha_{17} PFC_i + D1998 + D1999 + D2000 + D2001 + D2002 + D2003 + D2004 + D2005 + D2006 + \varepsilon_{it}$$

$$WOTA_{it} = \alpha_0 + \alpha_1 MTR - PRE_{it} + \alpha_2 SM_{st} + \alpha_3 IND\_GROWTH_{st} + \alpha_4 LGDP_{st} + \alpha_5 LEV_{it} + \alpha_6 LEVW_{it} + \alpha_7 PROF_{it} + \alpha_8 ZSC_{it} + \alpha_9 ZSCW_{it} + \alpha_{10} CR_{it}$$
$$+ \alpha_{11} TA_{it} + \alpha_{12} SIZE_{it} + \alpha_{13} BATH_{it} + \alpha_{14} SMOOTH_{it} + \alpha_{15} SPC_{it} + \alpha_{16} PFC_i + D1998 + D1999 + D2000 + D2001 + D2002 + D2003 + D2004 + D2005 + D2006 + \varepsilon_{it}$$

Robust standard errors in parentheses. Superscript asterisks indicate statistical significance at 0.01 (***), 0.05 (**) and 0.10 (*).

APPENDIX 1: Definition of the accounting items used to compute the control variables (codes refer to AIDA database classification)

- "Write-downs of equity investments": item D.19.a of Income Statement;
- "Total assets": sum of "Unpaid share of capital due from shareholders" (item A of Asset section of Balance Sheet), "Fixed assets" (item B of Asset section of Balance Sheet), "Current Assets" (item C of Asset section of Balance Sheet), "Accrued incomes and prepayments" (item D of Asset section of Balance Sheet);
- Pre tax and write-downs of equity investment result: sum of "Value of production" (item A of Income Statement), "Cost of production" (item B of Income Statement), "Financial income and charges" (item C of Income Statement), "Non-recurring incomes and charges" (item E of Income Statement);
- Sales: item A.1 "Revenue from sales and services" of Income Statement;
- Debt: item D "Payables" of Liabilities section of Balance Sheet;
- "Equity": item A of Liabilities section of Balance Sheet;
- Equity Investments: item B.III.1 "Shareholdings" of Asset section of Balance Sheet;
- EBIT: difference between "Value of production" (item A of Income Statement) and "Cost of production" (item B of Income Statement);
- Working capital: difference between the classified Balance Sheet's items "Current Assets" and "Current Liabilities";
- "Tangible assets": item B.II of Asset section of Balance Sheet.