Taxes and Financial Reporting: Evidence from Discretionary Investment Write-Offs in Italy

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Abstract

This paper provides further empirical evidence on the relationship between taxes and financial reporting by focusing on accounting decisions to write-offs equity investments. The analysis is based on panel data for Italian companies. In the period 1998-2006 the Italian corporate income tax has been reformed several times. In particular the tax deductibility of write-offs of equity investment was repealed in 2004. The paper exploits the ensuing high cross-sectional and times series variation in the marginal tax rate to identify tax effects. The econometric analysis delivers strong evidence that taxes affect the probability of write-offs. In contrast there is no evidence that taxes affect the magnitude of the write-offs. The paper also tests for the existence of a trade-off between tax minimization and non tax costs such as financial reporting costs and agency costs. Surprisingly, the evidence of such trade-off is rather weak.

JEL-Code: H25, H32, K34, M41.

Keywords: corporate taxation, write-offs of equity investments, financial reporting, tax planning.

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Introduction

This paper examines the factors that affect both the accounting decision to write-off equity investments and the magnitude of such write-offs[1], in a framework characterised by the alignment between financial report and tax return. The literature has long recognized that asset write-offs differ from most financial statement informations because of greater discretion as to their magnitude and timing (Elliot and Shaw, 1988) and has provided consistent evidence of strategic use of asset write-offs to manipulate financial statements. Quite surprisingly, the same literature have rather neglected the role of taxes in write-off decisions. To the extent that write-offs are tax deductible, they can be used to reduce the tax burden of a firm. It is therefore interesting to understand to which extent taxes affect the discretionary choice to report a write-off and the decision on its magnitude and to verify whether there is a trade-off between tax minimization and other organizational goals. Answers to these questions may contribute to better understand the coordination of taxes and other factors in business decisions (Shackelford and Shevlin, 2001).

Equity investment is a natural candidate to investigate the role of taxes in write-off decisions. In the case of a depreciable asset a write-off 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-off entails a permanent reduction in taxable income: the incentive to manipulate impairment reporting 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 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 statutory tax rate and tax base to generate simulated marginal tax rates (MTR) which display considerable cross-sectional and time-series variation using the Graham-Shevlin methodology (Shevlin, 1990 and Graham 1996a, 1996b, 1999). The second reason which makes the Italian case interesting is that the tax deductibility

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[1] We use the term "write-off" to refer to recognition of the reduced or zero value of investment.

of investment write-offs has been repealed in 2004: this provides an ideal setting for testing the effect of taxes on financial reporting.

The paper contributes to the existing literature in several respects. First, to our best knowledge this is the first paper that provides direct evidence of tax-effects in write-offs decisions. There are several papers which have investigated the empirical determinants of assets' write-offs but none of them have considered the MTR among the explanatory variables. Second, the paper uses the Cragg (1971) methodology to provide separate estimates of the impact of tax and non-tax factors on the probability to account a write-off and on its magnitude once the decision of writing-off the asset has been taken. The econometric analysis provides strong evidence that taxes affect the probability of write-offs. In contrast there is no evidence that taxes affect the magnitude of the write-offs. Third, the paper tests for the existence of a trade-off between tax minimization and non tax costs such as financial reporting costs and agency costs. Quite surprisingly, the evidence of such trade-off is rather weak.

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-offs 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.

1   Literature review

There are two lines of research that are relevant for this study. The first one is the literature which has investigated the factors affecting the decision to record asset write-offs.

The recognition of an asset impairment should be based on the comparison between the carrying value and the economic value of the asset. However, as noted by Elliot and Shaw (1988) asset write-offs "differ from most financial statement information because of greater discretion as to their magnitude and timing." (p. 92). The discretion inherent in the accounting rules, combined with the potentially large size of write-offs, implies

that managers could strategically adjust the timing and amount of such write-offs, in order to recognize the impairments only when it is advantageous to do so.

Managerial discretion was substantial in US before the mid-1990s as accounting standards provided little authoritative guidance on the accounting for most types of asset impairments, other than inventory (Francis et al., 1997). By comparing the financial characteristics of each write-offs firm to the average performance of a control group of firms in the same industry that did not announce write-offs, Strong and Mayer (1987) and Elliot and Show (1988) showed 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 taking 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. (1997).

Subsequent studies has shown that asset write-offs may be used strategically even in presence of authoritative guidance. Widespread concerns about the frequency and magnitude of write-offs led the Financial Accounting Standard Board to adopt in 1995 SFAS No. 121, which specifies the criteria for determining whether impairment of long-lived assets has occurred and how much impairment should be recognized. Riedl (2004) and Boone and Raman (2007) have analyzed US data after the introduction of SFAS No. 21 and both conclude that write-offs 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) find a positive relation between firms accounting write-offs and management changes using data respectively from Australia and Singapore.

The second strand of the literature related to this paper is the empirical research in accounting on the coordination of taxes and other factors in business decisions. Papers in this field focus on the trade-off between tax minimization and other organizational goals. Shakelford 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 have been provided in several fields such as corporate financing decisions, divestiture method, inventory accounting, R&D expenditure decision, compensation policies and pension plans (Shakelford and Shevlin, 2001). Research addressing taxes and agency costs is much less well developed than the book–tax coordination literature. An issues that have received attention in recent years is the link between tax planning and the ownership structure. Chen et al. (2010), examines 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.

Quite surprisingly, both strands of the literature have rather neglected the role of taxes in write-offs decisions. To the extent that write-offs are tax deductible, they can be used to reduce the tax burden of a firm. The reduction will be temporary, in case of a depreciable asset, as the write-off 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. It is therefore interesting to understand to which extent taxes affect the discretionary choice to report a write-off and the decision on its magnitude and to verify whether there is trade-off between tax minimization and other organizational goals.

Some evidence of the relevance of taxes is provided by Strong and Mayer (1987). They document a significant negative relationship between write-offs and the increase in the amount of tax loss carry-forwards with respect to 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-offs may be tax motivated: firms find advantageous to increase write-offs 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-section analysis of a

large sample of Slovenian small private companies (SPCs). They find that more profitable companies are more likely to write-off and the write-off magnitude is greater. Assuming that in SPCs there are no agency issues between owners and managers and that owners-managers of SPCs are exposed to pure incentives to rationally minimize the present value of present and future tax payments, Garrod et al. (2008) interpret their finding as the 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 which measure the marginal tax rate with error and that may be correlated with other variables which affect write-offs. Accordingly, as suggested by Shakelford and Shevlin (2001), caution must be exercised in interpreting results. This point is clearly illustrated by the fact that both papers uses losses as a control variable but they provide a different interpretation for the estimated coefficients. As mentioned before, Strong and Mayer (1987) find a *negative* association between losses (namely an increase in loss carry-forward) and write-offs and interpret it as the proof that write-offs 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 paper try to overcome this limitation by calculating firm specific MTRs using the Graham-Shevlin methodology (Shevlin, 1990 and Graham 1996a, 1996b, 1999). 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 estimated MTRs which allow to clearly identify tax effects.

2   *Institutional background*

2.1   Accounting for write-offs of equity investments

The Italian Civil Code (art. 2426) establishes that 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-off in the investment valuation. The write-off is based on management's judgment that the equity investments have experienced a permanent reduction in value. The write-off 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-off have been unchanged from 1998 to 2006.

The adoption of International Financial Reporting Standards (IAS/IFRS)[2], from 2005 onwards, doesn't eliminate the discretion in the decision to account investment write-offs. In fact, the IAS39 (the International Accounting Standard which 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 impairment is indicated, the amount is calculated by reference to IAS 36 (Impairment of Assets).

2.2 Tax treatment of equity investment write-offs in Italy before and after the 2004 Tax Reform

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 civil code) subject to some adjustments. From 1998 to 2000 tax rate on IRPEG was stable at 37%; it has been 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.

In 1997, in order to reduce the tax cost of equity, the corporate tax regime was amended. Profits were split into two components. One component was categorized as

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[2] The adoption of International Financial Reporting Standards was required for all companies listed in regulated European markets by the European Union, with the issuing of Commission Regulation n. 1606/2002, has required . The IAS/IFRS consist of a set of international accounting principles, the adoption of which aims at establishing clear rules within the European Union to draw up comparable and transparent annual reports and financial statements. Their adoption represents an essential element to obtain an integrated, competitive and attractive European capital market, which has impelled the European Commission to introduce this set of uniform accounting standards for listed EU companies. Moreover, the Italian Parliament established that for the financial year 2005 listed companies, financial institutions, banks and other regulated financial companies could choose to adopt IAS/IFRS or not, in drawing up separate financial statement; otherwise, starting from 2006 those companies should have been forced to assume the international accounting standards, in drawing up separate financial statement. Starting from 2005 for the other companies[2] it is optional to adopt IAS/IFRS or not.

"ordinary income", the opportunity cost of new equity financing, and taxed at a rate of 19%. "Ordinary income" 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. Another element of the tax base was the "extra normal profit" measured as the difference between total profit and "ordinary income". This second component was taxed at the IRPEG tax rate. It was also established that the average tax rate had to be higher than 27%[3] and that, if the IRPEG tax base was smaller than the "ordinary income", the difference between "ordinary income" and IRPEG tax base could be carried forward and used to calculate IRPEG in the following years (up to 5 years). Despite this new method of taxation was commonly named DIT (Dual Income Tax) it was different from the dual income taxation implemented in the Nordic Countries and more similar to the ACE scheme.

Under the IPREG regime investment write-off were fully deductible from the tax base. In order to limit avoidance strategies, the law requires that, in the presence of equity investments evaluated using the equity method, the deductible write-offs cannot exceed the impairment evaluated using the cost method (comma 1-ter art. 66 TUIR). Further anti-avoidance provisions, for the write-offs of equity investments accounted using the cost method, were introduced in 2002, with the legislative decree n.209. In particular this decree established the write-offs should be calculated with reference to the reduction in the equity value of the investee company net of distribution of retained earnings, non-deductible goodwill amortizations and non deductible provisions.

In 2003 the Government implemented a new tax reform, which came into force in 2004. The corporate income tax was renamed IRES (*Imposta sul Reddito delle Società*). The reform established the reduction of the statutory tax rate from 36% to 33% and repealed the DIT. Moreover the reform introduced the participation exemption rule, which provides the exemption from the corporate tax base of capital gains arising from the disposition of corporate shares and investments in other companies. In order to qualify for the exemption of capital gains, four requirements must be met[4]: the stocks should be

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[3] 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%.
[4] We consider the value of equity investments accounted in the financial assets' section, which satisfy the four requirements for the participation exemption.

held without interruption for a minimum period of time (holding period)[5] and should to be booked as a long-term asset in 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 the "black list". Accordingly, it was established the non-deductibility of write-offs for the equity investments which would have benefited from the tax exemption of capital gains.

3   *The marginal tax rate*

The reduction of tax liabilities, due to a marginal increase in deductible write-offs of equity investments, is measured by the MTR. This 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 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. The computation of the MTR requires two sets of information. The first one regards the corporate taxation rules (in particular the level of statutory tax rate and the tax code treatment of net operating losses). The second is managers' expectations on future income flows.

Tax provisioning governing Italian companies between 1998 and 2003 entail that in order to calculate the MTR we must distinguish three different cases:

a)   in year t IRPEG "Extra normal profits" are positive and the average tax rate is higher than 27%[6]. An additional unit of income pays the comprehensive tax rate. Hence, in this case, the MTR is equal to:

$$MTR = \tau_{IRPEG}$$

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[5] When enacted, the minimum holding period requirement was twelve months. Later on, it was increased to eighteen months.

[6] As already pointed out in footnote 3, in 2001 the minimum level requirement for average tax rate (at least 27%) was abolished, so it was sufficient that IRPEG "Extra normal profits" were positive to be in the case "a"; in 2002 it was introduced a new minimum level requirement for average tax rate (at least 30%), so it was necessary that IRPEG "Extra normal profits" were positive and the average tax rate was higher than 30% to be in the case "a".

where τ_{IRPEG} represents the statutory IRPEG tax rate.

b) in year t the IRPEG tax base is smaller than "Ordinary income" or the average tax rate is lower than 27%[7]. 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 of 27%. Second, it reduces the "Ordinary income" that can be carried forward and used to calculate IRPEG in the following years. If IRPEG taxable income in year $t+1$ is smaller than "Ordinary income", the firm next applies the "Ordinary income" in excess to taxable income in year $t+2$ and so on. Assume that $t+n$ is the first year when the IRPEG "Extra normal profits" are positive. If $n>5$ a reduction in the "Ordinary income" carry-forward in year t has no consequences on the IRPEG that the company will pay in future years. In this case the MTR is therefore equal to the minimum tax rate of 27%. On the other hand, if $n<5$, a unit increase in 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 of 27% plus the discounted value of the IRPEG saved in year $t+n$.

Summarizing:

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

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

where $\tau^{m}{}_{IRPEG}$ represents the IRPEG minimum tax rate.

c) In year t the IRPEG tax base is negative. In this case the MTR is equal to the discounted[8] value of the additional IRPEG that will be:

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

$$MTR = T \times (1+r)^{-n} \ \ \text{if} \ \ n<5$$

where $T = \tau^{m}_{IRPEG}$ or τ_{IRPEG} depending on the value of "Ordinary income" in year n.

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[7] See footnote 3.
[8] 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.

Since 2004, due to the abolition of the so-called "Dual income taxation" we have only two different scenarios:

a) In year t the IRES tax bases is positive. 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.

b) In year t the IRES tax bases is negative. The MTR is equal to the discounted value of the additional IRPEG that will be paid in year $t + n$:

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

$$MTR = \tau_{IRES} \times (1 + r)^{-n} \text{ if } n < 5$$

3.1 Simulating managers' expectations and marginal tax rates

The "true" marginal tax rate cannot be computed since it requires knowledge of managers' expectations on future income flows. We proxy managers' expectations using the method proposed by Shevlin (1990) based on the assumption that pre-tax 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 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 when the IRPEG tax base is smaller than "Ordinary income" or the average tax rate is lower than 27%[9] 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[10]. 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

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[9] In the period 1998-2000 we run simulations if the average tax rate is lower than 27%; instead, in 2002 and 2003 we run simulations if the average tax rate is lower than 30%. For more details see footnote 5.
[10] In calculating the present value of taxes to be paid, we suppose a myopic behavior by companies which conjecture that in the following five years the statutory tax rate will be equal to that of the current year.

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 been recently questioned by Blouin et al (2010).[11] They show that the Shevlin/Graham MTR forecasting approach produces inaccurate estimates of mean future income (too high when current income is high and too low when current income is low) and underestimates the future volatility of income for all income groups. The reasons are twofold. First, income is better described by a mean-reverting process rather 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 substantially under-state the future volatility. 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 analysed by Blouin et al.(2010) (27 years from 1980 to 2007): this should reduce the under-estimation of income volatility for growing firms. Second, loss-carryforward is limited to five years in Italy compared to the twenty-two years in US. The shorter forecasting horizon should reduce the error in the simulated MTR.

Besides the Shevlin/Graham proxy (which we refer to as MTR), we have considered an additional measure for the marginal tax rate. This alternative variable (which we will refer to as 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 investment write-offs and equal to zero otherwise. By assuming a sort of myopic behaviour we are actually reducing across-company variability when compared to MTR.

4   *Non tax motives of write-offs*

Tax minimization is not the only factor which drives discretionary write-offs of equity investments. On the one hand, managers may record write-offs of equity investments to account for poorer participated firm's performances. On the other hand, tax motivated

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

write-offs of equity investments may bring about several non tax costs. We insert in our model several variables to control for non tax effects.

4.1 Impairment motive

Firms may account write-offs of equity investments in 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 reflect the trend of the performance of the investor company. We suppose, in fact, that firms will be more likely to invest in the equity of companies which are in the same industrial sector.

Stock Market Trend

We also include a proxy for the trend of the stock market calculated for different industrial sector $(AZIO_{st})$ [12].

$$AZIO_{st} = \frac{MIB_{st} - MIB_{st-1}}{MIB_{st-1}}$$

We expect that firms in sectors characterized by a decreasing trend of stock market are more likely to account write-offs of equity investments.

Performance of the firm's industry

We also add two variables to proxy for the performance of the investor firm's industry. We compute the average sales growth (IND_GRO_{st}) and the log of GDP $(LGDP_{st})$ in each industrial sector of the investor company (e.g. Francis, Hanna and Vincent, 1996). We predict that firms in decreasing industries will be more likely to account write-offs of equity investments (since we suppose that the investor and the investee company are in the same industry sector and the write-offs could reflect an impairment of the performance of the investee companies) than firms in growing ones.

However, both the variables could be considered proxies as well as for impairment motive also for financial reporting costs. In the last case, we expect to find a positive

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[12] To calculate the value of $(AZIO_{st})$ we use the data diffused by BORSA ITALIANA "Indici MIB Storici Settoriali, base 30.12.1994=1000".

link between the variables IND_GRO_{st} and $LGDP_{st}$ and the decision to account investment write-offs, since for firms in declining industries it will be very important to record a better performance, in order to reduce the financial reporting costs.

4.2   Financial reporting costs

The trade-off theory implies that firms balance the benefits of write-offs with the financial reporting costs. Financial reporting costs are related to reporting lower income and are a direct consequence of tax-minimization strategies. Many financial agreements with stakeholders (for example with creditors, lenders or customers) use accounting numbers to specify the terms of trade, influencing manager's willingness to report lower income. Thus, the choice to account write-offs of equity investments involve weighing the tax incentive to lower taxable income against the financial reporting incentives to increase book income, making better the external stakeholders' perception of the company. In this section we will introduce several variables to analyze the importance of the external perception of the company.

Our assumption is that more indebted companies, less liquid companies, companies with smaller profitability and companies with a higher probability of bankruptcy are exposed to higher controls by stakeholders and will prefer to record a better performance, in order to not increase the costs of borrowing, rather than to minimize taxes.

Debt to Equity Ratio

We expect that very indebted companies will be less likely to accounting write-offs of equity investments, because they should prefer to record a better performance, in order to obtain a better creditor's perception and not to increase the costs of debt, even at the cost of not minimizing the fiscal imposition (e.g., Bontempi et al., 2004). For this reason we control for:

$$LEV_{it} = \frac{(Debt)_{it}}{(Equity)_{it}}$$

In addition we control for $LEVW_{it}$, which is a value of the debt to equity ratio weighted according to the ratio Equity Investment/Total Assets:

$$LEVW_{it} = LEV_{it} \cdot \frac{(Equity\ Investment)_{it}}{(Total\ Assets)_{it}}$$

This variable should capture the effect of higher creditor control on write-offs when equity investments are a higher share of total assets.

Profitability

For very profitable companies the probability to need loans decreases and the external consideration becomes less important; so it is possible to act to minimize current tax liabilities. As a consequence we expect that very profitable companies use write-offs to reduce taxable profits more than less profitable ones. We modify the profitability used by Garrod, Kosi and Valentinovic (2008):

$$PROF_{it} = \frac{(EBIT)_{it}}{(Total\ Assets)_{it-1}}$$

Z-score

We expect that firms will be less likely to account write-offs of equity investments if the expected costs of financial distress are high, in order to obtain a better firm's external perception. A variable linked to expected distress costs is Altman's (1968) Z-score. The Z-score predicts the probability of bankruptcy within two years: the lower the value of ZSC_{it}, the higher the probability of bankruptcy.

We modify the Z-Score used by MacKie-Mason (1990), Graham, Lemmon, and Schallheim (1998) and Alworth and Arachi (2001) and use a ZSC_{it} which is defined as:

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

In addition we insert $ZSCW_{it}$, which is equal to ZSC_{it} weighted according to the ratio equity Investments/Total Assets:

$$ZSCW_{it} = ZSC_{it} \cdot \frac{(Equity\ Investments)_{it}}{(Total\ Assets)_{it}}$$

Liquidity

Liquidity can affect the cost of borrowing. With regard to liquidity, the most basic assumption is that illiquid firms face high ex ante borrowing costs. Then we expect that illiquid firms are less likely to accounting write-offs of equity investments than liquid ones, in order to account higher income and to not increase further the costs of borrowing.

We measure liquidity with the current ratio and with the value of tangible assets in respect to total assets (e.g. Graham, 2000), because we assume that tangible assets increase company's debt capacity, because these assets are promptly marketable in case of short-notice liquidation.

$$CR_{it} = \frac{(Current\ Assets)_{it}}{(Current\ Liabilities)_{it}}$$

$$TA_{it} = \frac{(Tangible\ Assets)_{it}}{(Total\ Assets)_{it}}$$

Size

Large firms have lower ex ante costs of financial distress, in general because they are more diversified. Large firms may also benefit for lower informational costs associated with borrowing. Firm size is gauged with the natural log of real sales accounted in the year preceding the accounting of write-off (e.g. Francis, Hanna and Vincent, 1996).

$$SIZE_{it} = \ln(Sales_{it-1})$$

We expect larger companies to be more likely to accounting write-offs of equity investments than smaller ones.

4.3   Agency relationships

In this study we insert a variable to proxy for the ownership structure of the companies analyzed. We suppose that 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.

Small private companies

We suppose that the ownership structure of small private companies leads to no significant separation of ownership from management, and that for small private companies financial reporting is more likely to be influenced by taxation (according to Garrod, Kosi and Valentincic, 2008).

We insert in our model the dummy variable SPC_i, which assumes value 1 for small private companies and value 0 for large and public ones. The criteria that denotes a company as "small private company" is defined in terms of total assets, sales revenues and number of employees[13] (*Official Gazette of Italian Republic, 4/1/2007*).

We expect that small private companies will be more likely to account write-offs of equity investments in order to reduce tax burden.

Participations in foreign companies

We insert a variable to proxy for the presence of information asymmetry. In particular we suppose that the presence of equity investments in foreign firms may influence the decision to account discretionary write-offs of equity investments. We expect that firms with equity investments in foreign firms will be more likely to account such write-offs, because it is more difficult to verify if the investee firm's income has been lower than in the previous year.

We introduce in our model the dummy variable PFC_i, which assigns value 1 to firms with foreign equity investments, value zero otherwise.

5   Data and summary statistics

The accounting data are gathered from the AIDA database, made by Bureau van Dijk Electronic Publishing, containing accounting information on more than 200.000 Italian firms.

Our sample is restricted to firms which:

1. have balance sheet data in all the years of the period 1997- 2006;
2. have at least one participated company;
3. are not sector "Agriculture, forestry and fishing".

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[13] A company is defined small if isn't a listed firms, the number of employees does not exceed 50 and fulfils one of the two following criteria: total assets at the end of fiscal year do not exceed 10 milions of euro, sales revenues at the end of fiscal year do not exceed 10 milions of euro.

We obtain a balanced panel data set of 5924 companies. Figure 1 shows the trend of write-down of equity investments, expressed in percentage of total assets ($WOTA$), from 1998 to 2006, for the companies in the sample. From 1998 to 2003 we have an increasing trend: the value of $WOTA$ grew from 6.6% to 8.5%, with the only exception of 2002, when the value decrease to 7.7%. This reduction is strictly linked to the crisis following 11 September 2001. The drop of the Index Stock Market in 2001 may explain the reason why the value of $WOTA$ grew to 8.3%, while the recovery of 2002 explain the $WOTA$ reduction to 7.7%. The peak of $WOTA$ in 2003 coincides with the reform of Italian Fiscal System, which abolished the deductibility of write-offs of equity investments starting from 2004 onward (2003 was the last year in which firms could benefit from the deductibility of write-offs of equity investments). From 2004 to 2006 there is a continuing decrease of $WOTA$, which goes down to 5.4% in 2006. This is consistent with the hypothesis that in previous years part of write-offs of equity investments were motivated by tax-planning.

Figure 1: Write-offs of Equity Investments with respect to Total Assets

Write-offs of Equity Investments (year t)/Total Assets (year t-1)
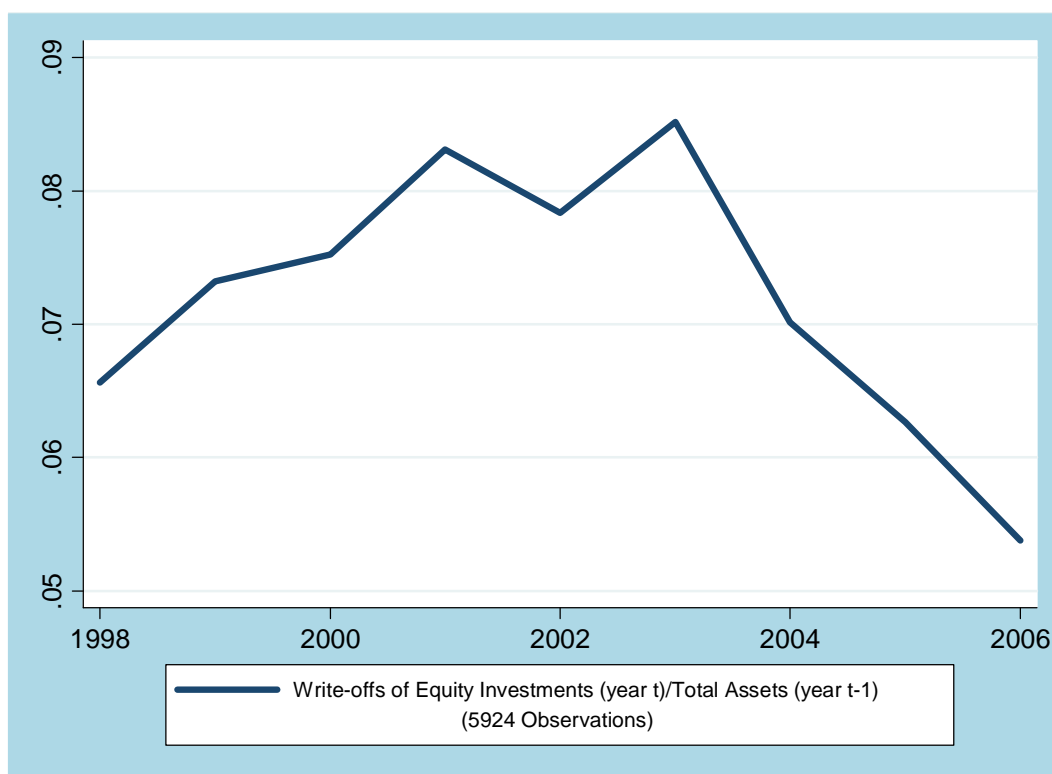(5924 Observations)

Table I reports summary statistics of all the variables included in the model. The dummy variable WO, which indicates if firms recorded write-offs of equity investments, has a mean of 0.1488 and a standard deviation of 0.3559. In particular 3258 firms of our sample have never accounted write-offs of equity investments in the years considered, while only 56 firms have recorded write-offs in every single year.

The marginal tax rate simulated using the Graham's methodology (MTR) has a mean of 0.3056 and a standard deviation of 0.0972, while the alternative proxy (TID) has a smaller mean (0.2924) and a higher standard deviation (0.1324).

The difference between TID and MTR comes from the different data used to calculate themselves. We use the income before taxes and investment write-offs to calculate TID, not taking into account the possibility to carry forward losses to offset the taxable income. On the contrary, to estimate MTR we use a measure of taxable income calculated using the value of income before taxes and including the possibility to carry losses forward. Moreover to calculate TID we use only the top statutory tax rate, instead to estimate MTR the tax bill is calculated using the entire corporate tax schedule.

Table II summarizes some industry specific facts about write-offs and corporate taxation (MTR and TID). For all the three variables, our sample contains full information over 5924 firms in 26 different ATECO 2002 sectors.

About a-half of the firms of our sample is in the ATECO sector "MANIFACTURING ACTIVITY" (48,41%), most of which work on "*Production of cars and mechanic machine*" (6,77%), "*Production of metal (excluding cars and plant)" (6,18%), "Food Industries" (5,72%)* and *"Textile Industries" (5,28%).*

More than one fourth of the firms is in the ATECO sector "COMMERCE AND REPARATIONS" (26,87%).

The table 2 shows that the minimum value of $WOTA$ has been recorded by firms in the sector "INSTRUCTION" (0.00148%), while the higher one has been recorded by the firms in the sector "FINANCIAL ACTIVITY" (0.84%).

Looking at the marginal tax rate the sector "CIVIL SERVICES" has reached the higher value of TID (35,11%), while very lower is the value of MTR (26,85).

On the other hand, the sector with the higher value of MTR is "WOOD INDUSTRIES" (32,80%).

All the variables exhibit a reasonable amount of variations across the sample.

As shown by table 3, the explanatory variables are essentially uncorrelated. The table 4 shows that there is no correlation between yearly marginal tax rate.

6 Estimations and results

In the first step of our analysis we want to investigate if there is a fiscal effect influencing the decision of accounting write-offs of equity investments. Using as dependent variable *WO* (a dummy variable which is equal to 1 for firms which have accounted write-offs of equity investments, 0 otherwise) we have a binary choice model. The multivariate analysis uses a Probit and a Logit model to estimate the importance of variables in explaining the decision to account write-offs of equity investments.

Afterward, in the second step, we use *WOTA* as dependent variable, where *WOTA* is equal to the ratio between write-offs of equity investments and total assets of the previous year. We use the Cragg's specification of the Tobit*t* model to estimate the importance of variables in explaining the amount of write-offs of equity investments accounted by firms (see Hsiao, 2003).

6.1 Decision to write-off

The table 5 summarizes the empirical results obtained estimating a Probit Random Effects Model and a Logit Random Effects Model. In order to consider the effects of the Italian fiscal reform of 2004 on the decision to account investment write-offs, we split the fiscal variable *MTR* into two components: *MTR − PRE* (*MTR* before fiscal reform) and *MTR − POST* (*MTR* post reform). In this way it is possible to investigate which are the effects of the fiscal variable on the decision to account write-offs of equity investments in a fiscal regime that admits or prohibit the deductibility of such write-offs.

Probit and Logit estimations yield almost the same results in terms of signs and significance level. Both the estimates support our hypothesis that the benefit of accounting write-offs of equity investments at the margin increases with the firm's marginal tax rate, if the fiscal system allows the deductibility of such write-offs. In fact, the variable *MTR − PRE* is statistically significant and affects positively the probability

to account write-offs of equity investments. On the contrary, the variable $MTR - POST$ is statistically significant and negatively correlated with WO. This implies that, in contrast with our hypothesis, after the Italian fiscal reform, the fiscal variable could influence the decision to account write-offs of equity investments.

It's important to underline that $MTR - POST$ has a negative sign, opposite to $MTR - PRE$. This allow us to assert that after Italian fiscal reform there was a change of the effect of fiscal variable in influencing the decision to account write-offs of equity investments.

Among the variables that proxy for the investee company's performance, the stock market trend doesn't result statistically significant. Both the proxies for the performance of the firm's industry result statistically significant and positively linked to the probability to account investment write-offs, indicating that it will be more appropriate to consider these variables as proxies for the financial reporting costs rather than for the impairment of the investee companies. These results are in line with Francis, Hanna and Vincent (1996), which find that firms in industries with increasing trend are more likely to take write-offs.

Among the variables that proxy for the financial reporting costs LEV, $PROF$, CR and $SIZE$ are statistically significant and have the expected signs.

In particular write-offs are more likely in bigger and more profitable firm. The probability of write-offs is lower in higher leveraged companies.

The variable $LEVW$ is statistically significant and is positively linked to WO. It shows that the positive effect of the ratio Equity Investments/Total Assets on the probability to account write-offs of equity investments more than offsets the negative effect of LEV.

In contrast with our expectations, the variable ZSC results negatively linked to the probability to account write-offs of equity investments. Instead, the Z-score weighted according to the ratio Equity Investments/Total Assets is statistically significant and has the expected sign.

The independent variable TA is statistically significant, but, contrary to what we expected, it is negatively linked to the probability to account investment write-offs.

The variable *PFC* results highly statistically significant and has the expected sign, confirming our hypothesis that companies with equity investments in foreign firms are more likely to account investment write-offs.

The variable *SPC*, instead, results not statistically significant underlining that the ownership structure of small private companies doesn't affect the probability to account investment write-offs.

The table 6 summarizes the coefficients and the marginal effects of the yearly *MTR*. The results confirm the presence of a fiscal effect which could influence the decision to account investment write-offs. In fact, by one side all the yearly fiscal variable from 1998 to 2003 are highly statistically significant and are positively linked to *WO*. On the other side *MTR* 2004 is not statistically significant and *MTR* 2005 and *MTR* 2006 are both statistically significant and negatively liked to the decision to account write-offs of equity investments.

Additionally it is important to underline that in 2003 we record an high impact of the fiscal variable on the write-off decision, probably due to the anticipation of following write-offs. In fact, known the impossibility to benefit from the deductibility of write-offs of equity investments from 2004 on, companies in 2003 could have decided to account an higher value of write-offs, bringing forward to 2003 the write-off which had been accounted from 2004 on.

6.2   Sensitivity and robustness checks

In the first set of sensitivity analysis, following Graham (1996b), we define an alternative version of the marginal tax rate: the taxable income dummy (*TID*), which is a dichotomous variable based on the sign of current period taxable income before write-offs. The variable *TID* has value equal to the top statutory tax rate for firms with a positive income before taxes and before write-offs, value 0 otherwise. Also in this case, we split the fiscal variable into *TID − PRE* and *TID − POST*, in order to take into account the 2004 Italian fiscal reform.

In the column A of table 7 there are shown the marginal effects estimated using a Probit random effects model, which can be directly compared to the results summarized in table 5. We find that the parameter estimates, coming from the two models using two different variants of marginal tax rate, are not very different. The only one significant

difference concerns the fiscal variable after the reform (*TID – POST*), which results not statistically significant, in line with our expectations.

In the second set of sensitivity analysis we restrict our sample in various ways, in order to exclude potentially influential outliers from the sample.

We estimate the model restricting the sample to small private companies (as defined in par. 4.3). In line with our expectation, the results (column B of table 7) show that the *MTR – POST* is not statistically significant for small private companies. The signs and the significance level of the other variables are almost the same obtained estimating the full sample.

From table 2 it emerges that in some sectors there are few firms (e.g., "*Civil Services*" and "*Instructions*") and that about a-half of the firms of our sample are in the ATECO sector "*Manufacturing Activity*". Therefore we narrow our analysis respectively to industries whit more than 79 firms (removing about 2.000 observations) and to firms in the ATECO sector "*Manufacturing Activity*". In both the cases we obtain almost the same marginal effects estimated as in the original model (the results are summarized in column C of table 7 and column D of table 8, respectively).

It is possible that our empirical findings could be driven by the presence in our sample of companies with equity investments in foreign firms, whose income is more difficult to verify.

In column E and F of table 7, we present the results obtained excluding from the sample respectively the firms with equity investments in foreign companies and the listed companies. In the first case we examine whether the observed relationships between the decision to account investment write-offs and corporate tax rate is sensitive to the presence of investee foreign firms. In the second case, excluding by our sample the listed companies (which are exposed to several controls), we expect to find a stronger fiscal effect influencing the write-off decision. The results obtained in both the regressions are very similar to those obtained estimating the original model, underlining that the fiscal effect doesn't change in these subsample, contrary as expected.

6.3   Interaction terms

We modify our model to capture more evidence that firms trade-off taxes with financial reporting costs and agency costs on accounting decision to write-off equity investments.

In particular, we include an interaction term between tax and some non-tax costs, which is obtained multiplying the variable $MTR - PRE$ for the non-tax variables (because we assume that there is a trade-off up to 2003).

A significant coefficient on the interaction term is consistent with the hypothesis that firms consider the level of the other costs and trade-off tax and non-tax cost.

The results, presented in table 9, show that the coefficients on the interaction terms are not statistically significant, with the exception of the interaction term between taxes and LEV, $LEVW$ and ZSC. We may conclude that there is no convincing evidence that firms trade-off taxes between tax and non-tax costs and benefits.

6.4   Magnitude of write-offs

In this section we investigate which are the factors that could influence the magnitude of investment write-offs, limiting the analysis to that firms which account such write-offs. Before presenting the results of the econometric analysis of write-off decision, some methodological issues have to be discussed. The dependent variable, the propensity to account investment write-offs, is a doubly truncated random variable, which varies between 0 and 1 by definition, therefore frequently takes the value of zero. A generally used approach to dealing with the problem of censored samples is the Tobit model. This model uses all the information for the explanatory variables, and includes both the decision of whether or not to account investment write-offs and the level of such write-offs in a model (see Lin and Schmidt 1984 for details). In this model the change of 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.

The alternative specification, presented by Cragg (1971), instead, proposes a two stage specification, which separates the decision of whether or not to account investment write-offs from the decision of how much write-offs to account. The first stage of this specification uses the whole set of data and consider the decision to account or not investment write-offs. To estimate this stage the Probit model is appropriate. For the second stage, only the subset of firms which account investment write-offs is considered. A truncated estimation procedure is used because the dependent variable is observed only if it is greater than zero.

Taking the Tobit as the restricted model and the Cragg as the unrestricted model, the Tobit model is rejected at the 99% probability using a $Chi-squared$ Likelihood ratio test.

The table 10 shows the results for the Cragg model for the propensity to account investment write-offs for the sub set of "writing-off" firms. It results that there is an important difference between the influence of the fiscal variable on the probability and on the propensity to account investment write-offs. In fact, the variable $MTR-PRE$ results positively and significantly linked to the probability to account investment write-offs, whereas it is not statistically significant for the propensity to account investment write-offs for the "writing-off" firms. The fiscal variable after the 2004 Italian fiscal reform is statistically significant and is negatively signed, as in the Probit results.

In addition all the variables which proxy for the impairment motive result not statistically significant, exception made for the variable $IND-GRO$, which is statistically significant and has a positive sign (confirming that it will be more appropriate to consider the variable $IND-GRO$ as a proxy for the financial reporting costs rather than for impairment motive).

However, all the proxies for the financial reporting costs and for the agency relationship have the same impact on the probability and on the propensity to account investment write-offs, exception made for the profitability and for the current ratio, which is not yet statistically significant.

7   *Concluding remarks*

This paper provides evidence that managers manipulate earnings in order to reduce the corporate tax burden. Tax deductibility is the one of the most important factors which affects the probability of discretionary write-offs of equity investments. A mean level a unit increase in the marginal tax rate raises the probability of write-offs by about 7%-4%. The empirical analysis also confirms that tax minimization is limited by several non tax-costs. Write-offs of equity investments bring about a reduction of taxable income, a worse firm's performance, a worse firm's reputation and higher costs of borrowing. Opposite, the effect of the fiscal variable on the propensity to account investment write-offs results not statistically significant.

The results of this paper raise several interesting issues which will be scrutinized in future research. One is related to the effect of the abolition of tax deductibility on the average effective tax burden of Italian companies. Further, there is the question of whether financial account manipulation interacts with other business decisions such as financial and investment choices and whether it changes the effect of taxes on such choices.

References

ALWORTH, J., and G. ARACHI. 'The effect of taxes on corporate financing decisions: evidence from a panel of Italian firms.' *International Tax and Public Finance* 8 (2001): 353-376.

BONTEMPI, M.E., S. GIANNINI and R. GOLINELLI. 'Corporate taxation and its reform: the effects on corporate financing decisions in Italy.' Working Papers 501, Dipartimento Scienze Economiche, Università di Bologna, 2004.

BOONE, J. P., and K. K. RAMAN. 'Does implementation guidance affect opportunistic reporting and value relevance of earnings?' *Journal of Accounting and Public Policy* 26 (2007): 160-192.

BLOUIN, J., J. E. CORE and W. GUAY, 'Have the tax benefits of debt been overestimated?', Journal of Financial Economics, 98 (2010): 195-213

CHEN, S., X. CHEN, Q. CHENG and T. SHEVLIN. 'Are family firms more tax aggressive than non-family firms?' *Journal of Financial Economics* 95 (2010): 41-61.

COTTER, J., D. STOKES and A. WYATT. 'An analysis of factors influencing asset writedowns.' *Accounting and Finance* 38 (1998): 157-179.

CRAGG, J. 'Some statistical models for limited dependent variables with application to the demand for durable goods.' *Econometrica* 39 (1971): 829-844.

ELLIOTT, J., and W. SHAW. 'Write-offs as accounting procedures to manage perceptions.' *Journal of Accounting Research* 26 (Supplement) (1988): 91-119.

FRANCIS, J., J. D. HANNA and L. VINCENT. 'Causes and Effects of Discretionary Asset Write-Offs.' *Journal of Accounting Research* 34 (1996): 117-134.

GARROD, N., U. KOSI and A. VALENTINCIC. 'Asset Write-Offs in the Absence of Agency Problems.' *Journal of Business Finance & Accounting* 35 (2008): 307-330.

GRAHAM, J. R. 'Debt and the marginal tax rate.' *Journal of Financial Economics* 41 (1996a): 41-73.

GRAHAM, J. R. 'Proxies for the corporate marginal tax rate.' *Journal of Financial Economics* 42 (1996b): 187-221.

GRAHAM, J. R. 'Do personal taxes affect corporate financing decisions?' *Journal of Public Economics* 73 (1999): 147-185.

GRAHAM, J. R. 'How big are the tax benefits of debt?' *Journal of Finance* 55 (2000): 1901-1941.

GRAHAM, J. R., M. L. LEMMON and J. S. Schalleim. 'Debt, Leases, Taxes and the endogeneity of Corporate Tax Status.' *Journal of Finance* 53(1) (1998): 131-162.

LIN, T., and P. SCHMIDT. 'A test of the Tobit specification against an alternative suggested by Cragg.' *The Review of Economics and Statistics* 66 (1984): 174-177.

LOH, A. L. C., and T. H. TAN. 'Asset Write-Offs – Managerial Incentives and Macroeconomic Factors. *Abacus* 38 (2002): 134-151.

MACKIE-MASON, J. K. 'Do Taxes Affect Corporate Financing Decisions?' *Journal of Finance* 45 (1990): 1471-1493.

RIEDL, E. 'An examination of long-lived asset impairments.' *The Accounting Review* 79 (2004): 823-852.

SHACKELFORD, D.A., and T. Shevlin. 'Empirical tax research in accounting.' *Journal of Accounting and Economics* 31 (2001): 321-387.

SHEVLIN, T. 'Estimating corporate marginal tax rates with asymmetric tax treatment of gains and losses.' *Journal of American Taxation Association* 12 (1990):51-67.

STRONG, J., and J. MEYER. 'Asset writedowns: Managerial incentives and security returns'. *The Journal of Finance* 42 (1987): 643-661.

APPENDIX 1: Summary Statistics

Table 1: Descriptive Statistics for all Variables

Variable	Mean	Std. Dev.	Min	Max
WO	0.1488	0.3559	0	1
WOTA	0.0021	0.0125	0	0.5586
MTR	0.3056	0.0972	0	0.37
TID	0.2924	0.1324	0	0.37
MTR-PRE	0.2139	0.1684	0	0.37
MTR-POST	0.0916	0.1425	0	0.33
TID-PRE	0.2036	0.1796	0	0.37
TID-POST	0.0887	0.1463	0	0.33
AZIO	0.0415	0.2241	-1.709	0.7696
IND_GROWTH	.0608	0.1050	-6.9625	0.5934
LGDP	10.7002	1.0369	7.5402	12.3840
LEV	0.6734	0.1982	0	1
LEVW	0.0267	0.0574	0	0.9020
PROF	0.1212	3.740	-40.333	476.2
ZSC	1.737	1.096	-23.932	44.3608
ZSCW	0.0526	0.1162	-0.7029	2.7258
CR	0.0100	0.1905	0	31.4395
TA	0.1851	0.1619	0	0.99856
SIZE	9.779	1.160	1.098	15.6796
SPC	0.2372	0.4254	0	1
SPE	0.3313	0.4706	0	1

WO is the dummy variable equal to 1 if the firm has recorded investment write-offs. $WOTA$ is the ratio between investment write-offs and total assets of the previous year. MTR is the fiscal variable constructed using Graham's methodology. TID is the fiscal variable constructed using the value of income before taxes and investment write-offs and the top statutory rate. $AZIO$ is the growth rate of the MIB index for all the firms in the same sector. IND_GROWTH is the industry average sales growth. $LGDP$ is the industry log of GDP. LEV is the debt ratio and $LEVW$ is the debt ratio weighted according to the ratio total participations and total assets. $PROF$ is the profitability measured with ROA. ZSC is the modified Altman's (1986) Z-Score. $ZSCW$ is the Z-score weighted according to the ratio total participations and total assets. CR is the current ratio. TA is the value of tangible assets with respect to total assets. $SIZE$ is the natural log of sales. SPC is a dummy variable equal to 1 if firms are small private ones. PFC is a dummy variable equal to 1 if firms has participations in foreign firms.
The full sample is composed by 5924 firms and has 53.316 observations from 1998 to 2006.

Table 2: Summary Statistics for ATECO sectors

ATECO 2002 SECTORS	Mean WOTA	Mean MTR	Mean TID	Obs	Share in Sample
ORE-MINING MANUFACTURING ACTIVITY	.0017458	0.316558	0.3172223	288	0.54
Food Industries	.0012907	0.313556	0.2820518	3051	5.72
Textile Industries	.002713	0.293015	0.2704296	2817	5.28
Tannery Industries	.0011539	0.30711	0.2758897	1287	2.41
Wood Industries	.0014675	0.327999	0.3011934	486	0.91
Paper Industries, Printing and Publishing	.0036304	0.292544	0.2831986	1485	2.78
Production of coke, oil refinery	.0011721	0.322123	0.3212821	135	0.22
Production of chimical	.0031663	0.305106	0.2935664	1845	3.46
Production of non metal-bearing nugget	.0020253	0.319946	0.2982451	1926	3.61
Metallurgy	.0012475	0.315723	0.2962537	1017	1.91
Production of metal (excluding cars and plant)	.0015957	0.319238	0.3010747	3294	6.18
Production of cars and mechanic machine	.0025042	0.310261	0.299576	3609	6.77
Production of electric, electronic and optical machine	.0029418	0.310406	0.2990359	2178	4.08
Production of transports	.0026568	0.293177	0.2787902	810	1.52
Other manufacturing industries	.0016054	0.312343	0.2831385	1899	3.56
PRODUCTION AND DISTRIBUTION OF WATER, ELECTRICITY AND GAS	.0016904	0.298616	0.3123809	252	0.47
BUILDING	.0021993	0.309817	0.306588	4194	7.87
COMMERCE AND REPARATIONS	.0012517	0.313017	0.2924484	14328	26.87
HOTELS AND RESTAURANTS	.0034528	0.2769705	0.2834688	369	0.69
TRASPORTS, STRORING AND COMMUNICATIONS	.0019825	0.278518	0.2851962	2727	5.11
FINANCIAL ACTIVITY	.0084378	0.205101	0.3048643	405	0.76
REAL ESTATE, HIRE AND IT ACTIITY	.0039661	0.288347	0.2945168	3456	6.48
CIVIL SERVICES	.0012432	0.268455	0.3511111	9	0.02
INSTRUCTION	.0000148	0.286054	0.3388889	27	0.05
SANITATION AND SOCIAL WORK	.0031482	0.300464	0.3084388	711	1.33
OTHER PUBLIC, WELFARE AND SOCIAL SERVICES	.0029288	0.263493	0.2758574	729	1.37

Years 1998-2006 (53.316 observations)

Table 3: Cross-correlation. Years 1998-2006 (53.325 observations)

	MTR-PRE	MTR-POST	TID-PRE	TID-POST	AZIO	IND_GRO	LGDP	LEV	LEVW
MTR-PRE	1.000								
MTR-POST	-0.817	1.000							
TID-PRE	0.825	-0.728	1.000						
TID-POST	-0.770	-0.728	-0.687	1.000					
AZIO	-0.259	0.275	-0.233	0.262	1.000				
IND-GRO	0.002	0.012	0.001	0.010	0.100	1.000			
LGDP	-0.018	0.007	-0.005	0.017	0.038	0.076	1.000		
LEV	0.106	-0.043	0.003	-0.086	-0.021	0.057	0.164	1.000	
LEVW	-0.074	0.016	-0.038	0.036	0.016	-0.013	0.011	0.001	1.000
PROF	0.011	-0.001	0.010	-0.001	-0.004	-0.004	0.001	-0.008	-0.007
ZSC	0.128	-0.005	0.114	-0.008	-0.050	0.038	0.199	0.008	-0.230
ZSCW	-0.029	0.040	-0.001	0.051	-0.004	0.002	0.007	-0.147	0.542
CR	-0.019	-0.001	-0.001	0.006	-0.004	-0.003	0.008	-0.064	0.022
TA	0.015	-0.039	-0.011	-0.050	-0.015	0.005	-0.151	-0.200	-0.075
SIZE	-0.080	0.117	-0.071	0.107	-0.049	-0.035	-0.057	0.022	0.035
SPC	0.068	-0.078	0.054	-0.074	-0.011	0.037	0.162	0.079	-0.021
PFC	0.006	0.006	0.023	0.018	0.042	-0.029	-0.135	-0.059	0.160

	PROF	ZSC	ZSCP	CR	TA	SIZE	SPC	PFC
PROF	1.000							
ZSC	0.022	1.000						
ZSCW	-0.003	0.107	1.000					
CR	-0.001	-0.036	0.005	1.000				
TA	-0.002	-0.272	-0.095	-0.016	1.000			
SIZE	-0.091	0.118	0.143	-0.019	-0.061	1.000		
SPC	-0.003	0.176	-0.036	0.001	-0.066	-0.412	1.000	
PFC	-0.003	-0.132	0.103	0.021	-0.053	0.214	-0.174	1.000

Table 4: Cross-correlation between yearly MTR. Years 1998-2006 (53.325 observations)

	MTR2000	MTR2000	MTR2000	MTR2001	MTR2002	MTR2003	MTR2004	MTR2005	MTR2006
MTR1998	1.000								
MTR1999	-0.1172	1.000							
MTR2000	-0.1166	-0.1160	1.000						
MTR2001	-0.1163	-0.1157	-0.1151	1.000					
MTR2002	-0.1154	-0.1148	-0.1143	-0.1140	1.000				
MTR2003	-0.1145	-0.1139	-0.1133	-0.1130	-0.1122	1.000			
MTR2004	-0.1141	-0.1135	-0.1130	-0.1127	-0.1118	-0.1109	1.000		
MTR2005	-0.1128	-0.1122	-0.1116	-0.1113	-0.1105	-0.1096	-0.1092	1.000	
MTR2006	-0.1117	-0.1111	-0.1105	-0.1102	-0.1094	-0.1085	-0.1082	-0.1069	1.000

APPENDIX 2: Estimation Results

Table 5: Determinants of the Investment Write-offs decision

	Expected Sign	**A** (Probit RE Model)	**A.1** (Marginal Effects)	**B** (Logit RE Model)	**B.1** (Marginal Effects)
Fiscal Variables					
MTR-PRE	+	0.4274*** (0.1111)	0.0469*** (0.0122)	0.8695*** (0.2025)	0.0440*** (0.0103)
MTR-POST	N.S.S.	-0.4623*** (0.1296)	-0.0507*** (0.0143)	-0.7805** (0.2360)	-0.0395** (0.0120)
Impairment motive					
AZIO	-	0.0244 (0.0405)	0.0027 (0.0044)	0.0353 (0.0727)	0.0018 (0.0036)
IND-GRO	?	0.2078** (0.0907)	0.0228** (0.0099)	0.3954** (0.1619)	0.0200** (0.0082)
LGDP	?	0.0672*** (0.0167)	0.0073*** (0.0018)	0.1246*** (0.0307)	0.0063*** (0.0015)
Financial Reporting Costs					
LEV	-	-0.5194*** (0.0730)	-0.0569*** (0.0081)	-0.9772*** (0.1333)	-0.0494*** (0.0069)
LEVW	?	1.6896*** (0.2190)	0.1853*** (0.0247)	2.8385*** (0.3980)	0.1436*** (0.0206)
PROF	+	0.0054* (0.0031)	0.0006* (0.0003)	0.0101* (0.0055)	0.0005* (0.0002)
ZSC	+	-0.2803*** (0.0159)	-0.0307*** (0.0019)	-0.5509*** (0.0321)	-0.0279*** (0.0018)
ZSCW	+	0.8036*** (0.1080)	0.0881*** (0.0120)	1.4728*** (0.1965)	0.0745*** (0.0101)
CR	+	0.2046*** (0.0629)	0.0224*** (0.0069)	0.3441** (0.1129)	0.0174** (0.0057)
TA	+	-0.5411*** (0.0919)	-0.0593*** (0.0102)	-1.0402*** (0.1690)	-0.0526*** (0.0086)
SIZE	+	0.2728*** (0.0132)	0.0299*** (0.0016)	0.5016*** (0.0246)	0.0254*** (0.0014)
Agency Relationship					
SPC	+	-0.0068 (0.0363)	-0.0007 (0.0039)	-0.0088 (0.0671)	-0.0004 (0.0033)
PFC	+	0.5188*** (0.0362)	0.0662*** (0.0054)	0.9377*** (0.0663)	0.0558*** (0.0047)

***,**,* : significant at 1 percent, 5 percent and 10 percent respectively (Standard Errors in parentheses)

Results obtained using as fiscal variable MTR (Marginal Tax Rate constructed using Graham's methodology). MTR-PRE is equal to MTR from 1998 to 2003 and is equal to zero from 2004 to 2006; MTR-POST is equal to zero up to 2003 and is equal to MTR from 2004 to 2006. In the column A and in the column B there are respectively the estimated coefficients from the probit and logit random effects model. Instead, in the column A.1 and in the column B.1 there are the marginal effects.

5924 firms; 53.316 observations; 1998-2006; source: AIDA, BANCA D'ITALIA, ISTAT.

All data are measured in millions of euros.

Table 6: Estimation results. Estimated coefficients**:** yearly MTR

	Expected Sign	**A** (Probit RE Model)	**A.1** (Marginal Effects)	**B** (Logit RE Model)	**B.1** (Marginal Effects)
MTR1998	+	0.3724** (0.1302)	0.0407** (0.0142)	0.7374** (0.2382)	0.0371** (0.0120)
MTR1999	+	0.4543*** (0.1294)	0.0496*** (0.0142)	0.9179*** (0.2354)	0.0462*** (0.0119)
MTR2000	+	0.4399** (0.1299)	0.0481** (0.0142)	0.9111*** (0.2358)	0.0458*** (0.0119)
MTR2001	+	0.5856*** (0.1373)	0.0640*** (0.0150)	1.1743*** (0.2483)	0.0591*** (0.0125)
MTR2002	+	0.2829** (0.1369)	0.0309** (0.0149)	0.6064** (0.2482)	0.0305** (0.0125)
MTR2003	+	0.5304*** (0.1388)	0.0580*** (0.0152)	1.0524*** (0.2512)	0.0530*** (0.0127)
MTR2004	N.S.S.	-0.1164 (0.1479)	-0.0127 (0.0161)	-0.1295 (0.2683)	-0.0065 (0.0135)
MTR2005	N.S.S.	-0.4736** (0.1501)	-0.0518** (0.0165)	-0.7727** (0.2731)	-0.0389** (0.0138)
MTR2006	N.S.S	-0.8057*** (0.1519)	-0.0881*** (0.0168)	-1.4768*** (0.2786)	-0.0743*** (0.0142)

*** ,**,* : significant at 1 percent, 5 percent and 10 percent respectively (Standard Errors in parentheses)

Results obtained using as fiscal variable yearly MTR.
In the column A and in the column B there are respectively the estimated coefficients from the probit and logit random effects model. In the column A.1 and in the column B.1 there are the marginal effects.
5924 firms; 53.316 observations; 1998-2006; source: AIDA, BANCA D'ITALIA, ISTAT.
All data are measured in millions of euros.

Table 7: Robustness I

	Expected Sign	**A** (Yearly TID)	**B** (Small Private Companies)	**C** (Manifacturing Activity)
Fiscal Variables				
MTR-PRE	+		0.0274**	0.0678***
			(0.0132)	(0.0178)
MTR-POST	N.S.S.		-0.0095	-0.0417**
			(0.0158)	(0.0205)
TID-PRE	+	0.0794***		
		(0.0086)		
TID-POST	N.S.S.	-0.0125		
		(0.0102)		
Impairment motive				
AZIO	-	0 .0027	0.0063	0.0009
		(0.0044)	(0.0045)	(0.0058)
IND-GRO	?	0.0213**	0.0272**	0.0120
		(0.0099)	(0.0107)	(0.0178)
LGDP	?	0.0073***	0.0027	-0.0089
		(0.0018)	(0.0017)	(0.0054)
Financial Reporting Costs				
LEV	-	-0.0519***	-0.0370***	-0.0575***
		(0.0081)	(0.0086)	(0.0120)
LEVW	?	0.1838***	0.0853***	0.2530***
		(0.0247)	(0.0218)	(0.0407)
PROF	+	0.0006*	0.0005	0.0008
		(0.0003)	(0.0006)	(0.0013)
ZSC	+	-0.0316***	-0.0133***	-0.0387***
		(0.0019)	(0.0017)	(0.0038)
ZSCW	+	0.0881***	0.0431***	0.0426**
		(0.0120)	(0.0107)	(0.0195)
CR	+	0.0221**	0.0269**	0.0401**
		(0.0069)	(0.0096)	(0.0154)
TA	+	-0.0569***	-0.0345**	-0.0668***
		(0.0101)	(0.0100)	(0.0163)
SIZE	+	0.0299***	0.0067**	0.0398***
		(0.0016)	(0.0019)	(0.0027)
Agency Relationship				
SPC	+	-0.0001		0.0091
		(0.0039)		(0.0072)
PFC	+	0.0652***	0.0229**	0.0591***
		(0.0054)	(0.0069)	(0.0065)

***,**,* : significant at 1 percent, 5 percent and 10 percent respectively (Standard Errors in parentheses)

Marginal effects estimated using a probit model:
1) we use as fiscal variable TID, which is equal to statutory tax rate for firms with positive income pre-taxes and pre-write-offs of equity investment, zero otherwise. TID-PRE is equal to TID from 1998 to 2003 and is equal to zero from 2004 to 2006; TID-POST is equal to zero up to 2003 and is equal to TID from 2004 to 2006 (53.316 observations, 5924 firms);
2) the sample is restricted to small private companies (12.650 observations, 1927 firms);
3) the sample is restricted to firms in the ATECO sector "Manufacturing Activity" (26109 observations, 2901 firms).

Table 8: Robustness II

	Expected Sign	**D** (Ateco Sectors)	**E** (PFC=0)	**F** (no listed companies)
Fiscal Variables				
MTR-PRE	+	0.0466*** (0.0121)	0.0299** (0.0098)	0.0449*** (0.0119)
MTR-POST	N.S.S.	-0.0494** (0.0142)	-0.0251** (0.0116)	-0.0417** (0.0139)
Impairment motive				
AZIO	-	0.0049 (0.0048)	0.0063* (0.0038)	0.0033 (0.0043)
IND-GRO	?	0.0240** (0.0106)	0.0221** (0.0084)	0.0258** (0.0098)
LGDP	?	0.0079*** (0.0019)	0.0042** (0.0014)	0.0065*** (0.0018)
Financial Reporting Costs				
LEV	-	-0.0521*** (0.0082)	-0.0292*** (0.0067)	-0.0452*** (0.0080)
LEVW	?	0.1728*** (0.0256)	0.1117*** (0.0219)	0.1834*** (0.0246)
PROF	+	0.0006* (0.0003)	0.0001 (0.0009)	0.0005* (0.0003)
ZSC	+	-0.0292*** (0.0019)	-0.0183*** (0.0016)	-0.0284*** (0.0018)
ZSCW	+	0.0855*** (0.0122)	0.0659*** (0.0100)	0.0825*** (0.0119)
CR	+	0.0195** (0.0073)	0.0214** (0.0071)	0.0380*** (0.0102)
TA	+	-0.0565*** (0.0104)	-0.0275** (0.0080)	-0.0515*** (0.0099)
SIZE	+	0.0296*** (0.0017)	0.0155*** (0.0014)	0.0279*** (0.0016)
Agency Relationship				
SPC	+	-0.0011 (0.0039)	-0.0009 (0.0029)	-0.0004 (0.0038)
PFC	+	0.0646*** (0.0054)		0.0621*** (0.0053)

***,**,* : significant at 1 percent, 5 percent and 10 percent respectively (Standard Errors in parentheses)

Marginal effects estimated using a probit model:
- (D) Sample restricted to firms in ATECO sectors with more than 79 firms (51.363 observations, 5707 firms);
- (E) Sample restricted to firms with no foreign participations (35.649 observations, 3961 firms);
- (F) Sample restricted to no listed companies (52.560 observations, 5.840 firms).

Table 9: Regression with Interaction Terms

	Expected Sign	Coefficients		Marginal Effects	
Fiscal Variables					
MTR-PRE	+	1.3324**	(0.6092)	0.1459**	(0.0668)
MTR-POST	N.S.S.	-0.4986***	(0.1327)	-0.0546***	(0.0146)
Impairment motive					
AZIO	-	0.0311	(0.0871)	0.0034	(0.0095)
IND-GRO	?	-0.0483	(0.1972)	-0.0052	(0.0216)
LGDP	?	0.0763***	(0.0199)	0.0083***	(0.0021)
Financial Reporting Costs					
LEV	-	-0.4311***	(0.0913)	-0.0472***	(0.0101)
LEVW	?	1.3202***	(0.2798)	0.1446***	(0.0310)
PROF	+	0.0019	(0.0253)	0.0002	(0.0027)
ZSC	+	-0.2475***	(0.0212)	-0.0271***	(0.0024)
ZSCW	+	0.6324***	(0.1483)	0.0692***	(0.0163)
CR	+	0.1671**	(0.0728)	0.0183**	(0.0079)
TA	+	-0.4356***	(0.1186)	-0.0477***	(0.0130)
SIZE	+	0.2695***	(0.0133)	0.0295***	(0.0016)
Agency Relationship					
SPC	+	0.0056	(0.0509)	0.0006	(0.0056)
PFC	+	0.5340***	(0.0438)	0.0683***	(0.0065)
Interaction Terms					
MTR-PRE*AZIO	?	0.0007	(0.2882)	0.0001	(0.0315)
MTR-PRE*IND-GRO	+	0.9616	(0.6539)	0.1053	(0.0717)
MTR-PRE*LGDP	+	-0.0405	(0.0532)	-0.0044	(0.0058)
MTR-PRE*LEV	?	-0.5056*	(0.2904)	-0.0554*	(0.0318)
MTR-PRE*LEVW	?	2.3347*	(1.0925)	0.2558*	(0.1199)
MTR-PRE*PROF	+	0.0101	(0.0710)	0.0011	(0.0077)
MTR-PRE*ZSC	+	-0.1450**	(0.0687)	-0.0158**	(0.0075)
MTR-PRE*ZSCW	+	0.5399	(0.5425)	0.0591	(0.0594)
MTR-PRE*CR	+	0.5738	(0.4269)	0.0628	(0.0468)
MTR-PRE*TA	+	-0.5647	(0.3710)	-0.0618	(0.0406)
MTR-PRE*SPC	+	-0.0294	(0.1497)	-0.0032	(0.0164)
MTR-PRE*PFC	+	-0.0458	(0.1107)	-0.0050	(0.0121)

***,**,* : significant at 1 percent, 5 percent and 10 percent respectively (Standard Errors in parentheses)

Marginal effects estimated with a probit model, in which we use as fiscal variable MTR and insert the interaction terms between tax and non-tax costs.
5924 firms; 53.316 observations; 1998-2006; source: AIDA, BANCA D'ITALIA, ISTAT.
All data measured in millions of euros.

Table 10: Determinants of the Magnitude of Investment Write-offs - Cragg Analysis

	Expected Sign	*Coefficients*
Fiscal Variables		
MTR-PRE	+	0.0048
		(0.0057)
MTR-POST	N.S.S.	-0.0226**
		(0.0067)
Impairment motive		
AZIO	-	0.0023
		(0.0021)
IND-GRO	?	0.0068*
		(0.0039)
LGDP	?	0.0017
		(0.0012)
Financial Reporting Costs		
LEV	-	-0.0182***
		(0.0031)
LEVW	?	0.1452***
		(0.0165)
PROF	+	0.0008***
		(0.0001)
ZSC	+	-0.0091***
		(0.0014)
ZSCW	+	0.0409***
		(0.0081)
CR	+	0.0025
		(0.0018)
TA	+	-0.0194***
		(0.0046)
SIZE	+	0.0058***
		(0.0007)
Agency Relationship		
SPC	+	0.0014
		(0.0021)
PFC	+	0.0094***
		(0.0009)

***,**,* : significant at 1 percent, 5 percent and 10 percent respectively

(Robust Standard Errors in parentheses)

Results from a Cragg model, in which we analyze the determinants of the magnitude of investment write-offs, using as MTR fiscal variable (Marginal Tax Rate constructed using Graham's methodology). MTR-PRE is equal to MTR from 1998 to 2003 and is equal to zero from 2004 to 2006; MTR-POST is equal to zero up to 2003 and is equal to MTR from 2004 to 2006.
5924 firms; 53.316 observations; 1998-2006; source: AIDA, BANCA D'ITALIA, ISTAT.
All data are measured in millions of euros.