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TAXING CORPORATE INVESTMENTS: AN EVALUATION OF THE ITALIAN DIT

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Taxing corporate investments: an evaluation of the Italian Dit. *Very preliminary version*

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1 Introduction

The Italian Dit (or simply Dit hereinafter) was part of a comprehensive reform of corporate taxation carried over between 1996 and 1998 (Bordignon, Giannini and Panteghini, 1999 and 2001; hereinafter BGP 1999 and 2001). In its essence, the Dit was a compromise between the Dual Income Taxation schemes adopted by Nordic Countries and the ACE proposed by the IFS (IFS, 1991). Under the Italian Dit, a notional return (the so-called protective interest rate) was applied every year on the increase of the value of net equity since 1996. Subject to certain conditions, this notional return was taxed at a reduced rate (19% in most cases), while only the portion of the tax base exceeding this notional return was taxed at the ordinary rate (37% until 2000). Therefore, the Italian Dit could be seen as a *partial* ACE (Keen 2002), since i) the notional return on net equity was taxed at a reduced rate rather than being entirely deducted from the tax base and ii) only the increase of net equity since 1996, rather than the entire value of net equity, entered into the calculation of the tax base (*incremental regime*). Both limitations were mainly due to revenue reasons.

As it is well known, the 1998 reform was designed to increase the level of neutrality of the corporate tax system and was inspired by a well known strand of economic literature (see Bond and Devereux, 2003 for a recent summary of results on neutrality). The objective of the Dit was to reduce the tax advantage of debt financing, generated by the almost complete deductibility of interests paid on outstanding debt, and thus to create incentives for the reduction of the high leverage of many Italian companies.

The government appointed in 2001 soon took a completely different perspective and, after 'freezing' net equity for tax purposes to its outdstanding value in 2001, it definitely suppressed the Dit as by 2004 while at the same time enacting

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a new comprehensive reform of corporate taxation. The main motivation for the decision to suppress the Dit was the alleged fact that reduced taxation was 'used' only by few firms, especially larger ones located in northern (i.e. "richest") regions, doing 'financial' rather than 'real' investments. This viewpoint has been synthetized by Vitaletti (2002).

As for the number of firms which 'used' the Dit, we only know that in year 2002 approximately 108. 000 corporations were in a position to benefit from the reduced tax rate (Ministero dell'Economia, 2003, pp. 17-18) i.e they were *actual* Dit-users in 2002. This corresponds to a percentage of approximately 15% of the total number of corporations and of slightly more than 30% of corporations actually paying taxes. However no publicly available information about the features of the Dit-users has been provided by government sources.

While there is a number of papers describing the theoretical properties of the Dit system (Franzosi, 1999; BGP, 1999 and 2001; Panteghini, 2001) few applied work has been done on the matter. Most notable exceptions are Staderini (2001) and, to a lesser extent, Oropallo and Parisi (2004).

Staderini (2001) uses a panel of accounting data about 3.858 firms in the period 1992-1998 and estimates a rate of *potential* Dit-users, i.e of corporations increasing their equity from year to year, varying from 53% to 78%. The remarkable gap between these percentages and the number of actual Dit-users is probably due mainly to potential users having a negative or a negligible corporate tax base, as well as to the fact that Staderini (2001) selects firms having no less than 15 employees. Staderini (2001) uses a logit model to find that the probability of being potential Dit-users increases as profitability and productivity increases, while it decreases as size increases.

Oropallo and Parisi (2004, p. 15) evaluate the impact of the corporate tax reform of 2004 and, while doing so, they provide an estimate of the impact of the Dit on the effective corporate statutory tax rate using an integrated dataset which includes fiscal observations. They note that "the Dit systems favours small firms as compared to medium and large firms" where "favours" means that it generates a lower mean effective statutory rate.

Apart from size, there are many features of corporations which may have influenced the use of the Dit. Among these, there are the determinants of the financial structure of the firm (Titman and Wessels, 1988; Bontempi and Golinelli, 1996), some variables indicating the presence of economic or legal constraints to the level of net equity, other tax incentives as well as other indicators of the region of location and legal type of corporation.

The main objective of this paper is to study the features of Dit-users, as opposed to non Dit-users among corporations reporting a positive taxable income and making investments in a strict sense (i.e increasing the value of their tangible assets). The reason why we restrict attention to corporations reporting positive taxable income is that companies that do not pay taxes at all have simply no reason to use the Dit. The reason why we restrict attention to investments in tangible assets is that this is the notion of investments which is implicitly retained in economic analysis. However, we will say something about 'financial'investments' in section 6.

The paper is organized as follows. Section 2 provides an illustration of the Dit. Section 3 describes the features of the dataset and provide some descriptive statistics. Section 4 is devoted to the description of the econometric model. Section 5 presents preliminary results and related comments. Section 6 contains some remarks on financial investments. Section 7 discusses directions of future research. The Appendix reports the output of econometric regressions for both the logit and the probit specification.

2 An illustration of the Italian Dit

We now use a slightly modified version of the model by Bond and Devereux (2003) to illustrate main features of the Italian Dit. Assume that at time 0 the investment of 1 unit is made and that this is financed wholly or partially by debt $\lambda\epsilon\left[0,1\right]$. Assume also that at time 1 the debt (if any) plus interests at rate i is repaid and the project earns an uncertain cash flow of $\widetilde{R}_1$ net of operating costs but gross of depreciations and interests. Finally, at time 2 the project earns an uncertain cash flow $\widetilde{R}_2$ and the remaining assets are sold at the uncertain market value $\widetilde{K_2}$.

The net present value of the return on the investment at time 0, assuming no taxation, is written as

$$NPV^* = -(1-\lambda) + V_1^0\left[\widetilde{R}_1 - (1+i)\lambda\right] + V_2^0\left[\widetilde{R}_2 + \widetilde{K_2}\right] \tag{1}$$

where i is the interest rate on nominal debt between time 0 and time 1 and V_g^t indicates expectation in time t of an event happening at time g.

Let us denote with $r_1$the discount rate between time 0 and time 1. Let us also assume, following Bond and Devereux (1995), that $V_g^t[X] = X/(1+r)$ if X is a certain payoff where r is the appropriate discount rate. Then we have the following identity

$$\lambda = V_1^0\left[(1+i)\lambda\right] - \sigma_\lambda, \sigma_\lambda \equiv \lambda\frac{(i-r_1)}{(1+r_1)} \tag{2}$$

By substitution of (2) in (1) one obtains[1]

$$NPV^* = -1 + V_1^0\left[\widetilde{R}_1\right] + V_2^0\left[\widetilde{R}_2 + \widetilde{K_2}\right] - \sigma_\lambda \tag{3}$$

To illustrate the relationship between the Dit and investment taxation and profitability, let us also define:

[1] This framework is very similar to Bond and Devereux (2003) with two main differences: i) Bond and Devereux allow for the possibility of default and winding up in period 1, while these are not considered here; ii) here the possibility of a non perfectly-competitive financial market is explicitly accounted for allowing λ to be different from $V_1^0\left[(1+i)\lambda\right]$ even when there is no uncertainty about default and winding up. In other words, here it is assumed that the lender may have some market power enabling it to set an interest rate higher than the discount rate so that $\sigma_\lambda \geq 0$ (Bond and Devereux, 2003, p. 1304).

$z_t \equiv$arbitrary depreciation allowance in period t $(t = 0, 1)$;

$\widehat{r_t} \equiv$protective interest rate (called 'coefficiente di remunerazione ordinario' in the Dit jargon);

$\tau_d \equiv$reduced tax rate in the dual tax system.

All variables denoted with a tilde, as well as $\widehat{r_2}$, are uncertain at time 0, while at time 1 there is uncertainty only about the cash-flow and the market value of remaining assets at time 2.

Under the dit, total corporate tax in each period is equal to

$$\begin{aligned} T_0 &= -\tau z_0 \\ T_1 &= \tau\left[\widetilde{R}_1 - \widetilde{z_1} - \widehat{r_1}(1 - z_0 - \lambda) - i\lambda\right] + \tau_d \widehat{r_1}(1 - z_0 - \lambda) \\ &= \tau\left[\widetilde{R}_1 - \widetilde{z_1} - \alpha\widehat{r_1}(1 - z_0 - \lambda) - i\lambda\right], \alpha \equiv (\tau - \tau_d)/\tau \\ T_2 &= \tau\left[\widetilde{R}_2 + \widetilde{K_2} - (1 - z_0 - \widetilde{z_1})(1 + \alpha\widehat{r_2})\right]. \end{aligned} \tag{4}$$

As in Bond and Devereux (2003) model, continuous taxation of net revenues is assumed, so that economic profit and losses made in time t are taxed at time t, while variation of capital stock is recorded only at the end of the year. The latter explains why, though equity is raised at time 0, the allowance enters in T_1. Note that full recovery of the depreciation is assumed ($T_0 \leq 0$) and that only the realized capital gain on assets $(K_2 - 1 - z_0 - \widetilde{z_1})$ is taxed, but allowance is given in period 2 on all residual value $(1 - z_0 - \widetilde{z_1})$ of the investments since debt is supposed to be repaid by means of a new increase of equity[2].

Note also that (4) does not exhaust taxes on corporations, namely since it does not include Irap. For the project defined previously, the net present value of corporate tax payments under the Dit scheme is written as

$$NPV_{DIT}^{TAX} = T_0 + V_1^0[T_1] + V_2^0[T_2] \tag{5}$$

Using (4) and the value additivity principle[3], (5) is rewritten as

$$NPV_{DIT}^{TAX} = \tau\left\{NPV^* + NPV^z + NPV^\lambda\right\} \tag{6}$$

where

$$\begin{aligned} NPV^z &= (1 - \gamma)(1 - z_0) + V_1^0\left[(1 - z_0 - \widetilde{z_1})(1 - \widetilde{\delta})\right] \\ \gamma &\equiv \frac{(1 + \alpha\widehat{r_1})}{(1 + r_1)}; \widetilde{\delta} \equiv \frac{(1 + \alpha\widehat{r_2})}{(1 + \widetilde{r_2})} \end{aligned}$$

and

[2] Equity raised at time 0 is equal to $(1 - z_0 - \lambda)$; at time 1 debt is repaid by issuing new equity so that the value of equity decreases at $(1 - z_0)$, and then the value of the capital good is depreciated by $\widetilde{z_1}$.

[3] Proofs available upon request.

$$NPV^{\lambda} = V_1^0 \left[\left(\alpha \widehat{r_1} - r_1 \right) \lambda \right]$$

A sufficient condition for neutrality is that (Bond and Devereux, 2003 and 1995) $NPV^{TAX} = \tau NPV^{*}$where NPV^{TAX} is the net present value of tax payments[4]. With $1 > \lambda > 0$ or less than 100% immediate depreciation, a fully neutral 'shareholder tax' requires $\alpha = 1$ and $r_1 = \widehat{r_1}$, $\widehat{r_2} = \widetilde{r_2}$. As for the latter specification, reasons why pure neutrality would require the legislator to choose the discount rate are clearly explained in the literature: "it might at first seem that the proper notional return is a risk-adjusted rate that reflects the risk premium (...) However, the essence of the (...) scheme is that (...) all payments shareholders make to the firm are, in present value terms, deductible" (Keen, 2002, p. 415). Therefore under the Dit the corporate tax is not neutral not only since $\alpha < 1$, but also since the law allowed for the possibility to set a protective interest rate higher than the discount rate. Considering also the Irap and taxation at personal level, BGP (1999) show that, although the 1998 reform moves clearly towards neutrality, the resulting tax system was still favourable to debt financing.

3 The dataset

The dataset used here is a (weighted) sample of 16.069 firms representing a population of 89.553 corporations which paid taxes and made investments (in the strict sense defined in the introductory section) during year 2000. More specifically, the features of the population are the following ones:

1. positive taxable income in year 2000;
2. increase in the value of tangible assets between 2000 and 1999;
3. not belonging to the financial sector (banks, insurances and other financial companies are excluded);
4. having a turnover not inferior to 500 billions of ITL (250 000 euros) in 2000[5];
5. filing a reliable balance sheet and profit and loss account.

The data come from tax declarations (Unico-società di capitali) filed by corporations (1 declaration for every corporation). Tax declarations contains two types of data: i) general and economic data and ii) fiscal data. General and economic data include:

[4] Note that this implies: i) in the case of a marginal investment ($NPV^{*} = 0$) no tax is paid; ii) in the case of an infra-marginal investment ($NPV^{*} > 0$) a fixed fraction of its return is captured by taxation. This means that the hierarchy of projects is not altered by taxation: if project A is expected to be more profitable than project B with no taxation project A will be more profitable than project B also after taxation.

[5] This filter is inserted to make the results more comparable to those of Staderini (2001) who selects firms having more than 15 employees.

-a reclassified profit and loss account;

-a reclassified balance sheet, reporting outstanding values at the end of 1999 and at the end of 2000;

-supplementary information about the company (place of location, operating sector, etc.).

In particular, the profit and loss account and the balance sheet available in the dataset are summaries of the accounting documents and contain only aggregated data.

Fiscal data comprise:

-post-tax economic profit;

-tax variations (*variazioni fiscali*), i.e. corrections to post-tax economic profit to calculate the tax base;

-the components of the coporate tax base, namely the portion subject to ordinary taxation and the portion subject to reduced taxation.

All fiscal variables are very detailed and reliable.

In this work we define as Dit users (DU) firms which are Dit-eligible in year 2000. This is a less stringent criterion than the one used in official statistics (Ministero dell'Economia, 2003). In table 1 we report the percentage of Dit users (DU) in both the original sample (16.069 observations) and, after applying appropriate weights, in the population (89.553 corporations).

Table 1: Dit-users (DU) and non Dit-users (NDU)

	Sample	Population
DU	8.041	40.437 (45, 2%)
NDU	8.028	49.116
ALL	16.069	89.553

The incidence of DU is clearly higher than that reported in official statistics referring to all corporations (Ministero dell'Economia, 2003) mainly because of the filters adopted here and also because of the different definition of DU. Some descriptive features of the sample are outlined in Tables 2, where NF are northern firms (firms located in northern regions).

Table 2: Descriptive features of the population

means (.000 ITL)	DU	NDU
assets	15.268.306	7.349.337
% of NF	70%	51, 4%
tax base	1.019.060	323.682
tax liability	331.891	115.068
tax rate	31, 8%	34, 7%

In the population selected here, DU are larger (assets are more than double than those of NDU) and more concentrated in northern regions (70% versus 51,4%) than NDU. According to what it has been claimed by critics of the Dit (Vitaletti, 2002, p. 118) these should be features of DU also among the generality of Italian corporations. The effect of the Dit, and presumably of the 'Visco' incentive which was correlated to the Dit, is to reduce the weighted tax rate of approximately 3 percentage points ($31,8\%$ against $34,7\%$).

4 The model

We want to analyze the features of DU as opposed to those of NDU by means of a binary choice model. We define for every of the 16.069 firms included in the sample a binary variable y such that

$$\begin{aligned} y &= 1 \text{ if the firm is a DU} \\ y &= 0 \text{ otherwise (NDU)} \end{aligned}$$

we assume that

$$\text{Prob}[y = 1] = F(x, \beta)$$

where x is the vector of relevant effects and β is the vector of associated parameters.

In principle $F(.)$ may take the two following specifications

$$F(x\beta') = \frac{e^{\beta' x}}{1 + e^{\beta' x}}$$

for the logit model and

$$F(x\beta') = \Phi(\beta' x)$$

for the probit model. As it is well known (Greene, 1990, p. 666; Amemyia, 1981) there are no general rules for the choice of the logit or the probit model, and therefore we will be using both specifications. However, we do not expect to find large differences between logit and probit results since the sample contains a quite high number of both positive and negative outcomes

The choice to use the Dit should be associated with the choice to use equity rather than debt to finance (a portion of) investments. This choice, in turn, should be based on a comparison between the cost of equity and the cost of debt, i.e. the interest rate. In particular, a high enough interest rate (or a particularly low cost of equity) may explain the use of equity even if debt is still favoured by the tax system as it happens here (see section 2).

Unfortunately, we are not able to measure directly the relevant interest rate in our dataset, and therefore we have to use some proxies. The evidence seems to

indicate that interest rates decline with the magnitude of the loan and that they are lower for firms located in northern regions of Italy as well as for industrial firms. For example, at the end of year 1999 (Banca d'Italia, 2000, pp. 267-276) the average interest rate on short-time cash loans was equal to 5,30% in Italy, but ranging: i) from 4,83% in northern regions to 6,89% in southern regions; ii) from 8,66% on small loans to 3,71% on larger ones; iii) from 5,17% on industrial firms to more than 6% on non-industrial companies. To capture these differences we use two dummy variables, *dumnorth* and *dumind*, which equal unity respectively when the firm is located in northern regions and when it is an industrial firm, and a variable *size*, which is just the natural log of total value of assets. On the basis of the above reasoning we might expect a negative sign on all these variables, while we shall see that an alternative interpretation leads to the opposite conclusion.

Interest rates may vary also accordingly to the structure of the firm. The literature on determinants of firms' financial structure (Titman and Wessels, 1988; Bontempi and Golinelli, 1996) postulates that the interest rate is higher the lower is the value of tangible assets, since the latter may act as collaterals. On the contrary, general growth abilities of the firm can hardly be collateralized and therefore they should be positively related to the interest rate. We try to capture these aspects by constructing the variables *tang* and *growth* and, on the basis of considerations made above, we expect a negative sign of the coefficient on *tang* and a positive sign of the coefficient on *growth*.

As for the cost of equity, we note that profitability should be a key factor since a profitable firm is able to raise net equity through retained profits. To capture profitability we define the variable $profit$, which is the ratio between earnings before interests and taxes (ebit) and total assets. We expect a positive sign of the coefficient on this variable as obtained also by Staderini (2001). The use of equity can be influenced also by the presence of legal constraints namely requirements of a minimum amount of net equity (BGP, 1999). One of the most prominent example of such legal constraints in the Italian tax system is given by accelerated depreciation since firms which use this mechanism are adviced (though not legally forced) to retain corresponding amount of profits. Therefore we define a variable *amm* which measures the incidence of accelerated depreciation on total value of assets owned by the firm.

The literature has also stressed the possibility that in the short run the use of the Dit might have been a function of the ability to adjust to the new fiscal environment. In particular, BGP (1999) note that while ‹‹the primary aim of the reform was to boost companies capitalization (...) so far there is little evidence that this has happened›› and suggest that ‹‹ the ability of companies to make full use of the advantages of the fiscal system turns out to be of vital importance in determining the effect of the reform (...)›› and in the short run there might have been ‹‹a delay of companies to adjust their behaviour to new fiscal environment››. How can these considerations be taken into account? Usually larger firms have better tax pratictioners and consultants, while firms located in northern regions may benefit from a more business-friendly environment where information is available at lower costs and where public

services are on average more efficient. So the ability-to-adjust argument seems to suggest an interpretation of the role of dimension and of location opposite to the one mentioned above, and on these premises we might expect a positive sign on both *size* and *dumnorth*.

According to many observers, the limited use of the Dit was also due to its negligible impact on tax liability. Both amendments to the original ACE scheme, i.e. reduced taxation rather than complete deduction as well as the adoption of the *incremental regime*, may be seen as key factors. However, in year 2000, which we are considering here, several tax incentives , and in particular the so-called 'Visco' incentive, were in action. The Dit and the 'Visco' incentive were somehow similar since they both granted a tax reduction in the case of an increase of net equity, though the 'Visco' incentive was only a temporary measure and limitations to double counting were enacted. Therefore, the 'Visco' incentive may have operated reinforcing the Dit and therefore pushing firms to use equity. To capture this relationship we construct the variable *taxpos*, which is equal to the difference between the ordinary tax rate (which is equal across companies) and the incidence of the 'Visco' incentive on the tax base, i.e. it is equal to the tax rate without the Dit. A negative sign on the coefficient of *taxpos* is expected, since this would confirm the positive correlation between the use of the Dit and the use of the 'Visco' incentive.

Finally, to account for the heterogeneity of legal types treated as corporations by the fiscal system , we divide the sample in three categories, spa's (i.e large limited liability companies), srl's (i.e small limited liability companies) and others (mostly cooperatives). Then we insert two dummy variables, *spa* and *alnat*, which, respectively, take the value of 1 when the firm is a spa or when it belongs to the 'other' types and 0 otherwise. In this case we have no particular expectations about the sign of coefficients. Table 3 summarizes the relevant effects (the components of x's) considered here..

Table 3: Selected relevant effects

Variable	Definition
tang	tangible assets/total assets 2000
growth	% increase of total assets (2000 over 1999)
size	ln of total assets 2000
amm	accelerated depreciation/total assets 2000
profit	ebit/total assets 2000
dumnorth	1=if located in northern reg.,0=otherwise
taxpos	tax rate without the Dit
dumind	=1 if industrial, 0=otherwise
spa	=1 if spa, 0=otherwise
alnat	=1 nor spa neither srl, 0=otherwise

Comparing the model with the one used by Staderini (2001) to estimate the probability to be *potential* DU, we find that:

1) here we use 10 variables, while Staderini (2001) uses only 4 variables;

2) comparable variables are $profit$ (which is equal to Staderini's roa) and $size$; however the latter in Staderini (2001) is made equal to the log of employees, an information which is not available here;

3) Staderini (2001) uses expected growth which is $tang$ at the previous year and productivity which is based on the value added; here we have only 1-year results and available productivity measures are all positively correlated to $profit$ so we do not include any of them.

Among other differences, let us recall that Staderini (2001) has a panel of accounting data from which amm and $taxpos$ cannot be obtained, and that the sample used here includes 16.069 observations while Staderini (2001) uses 3.858 observations, from which outliers are also eliminated.

5 Some preliminary results

In this section we report some preliminary results of regressions ran using logit and probit specifications for the model described in previous section. The full version of the output is reported in the Appendix. We first discuss some general results about the goodness of fit of the two model specifications by comparing maximum values of the log likelihood function with its value at iteration 0 (i.e only with a constant included).

Table 4: General results with logit and probit

	Logit	Probit
Log likelihood (0)	$-11.062,603$	$-11.062,603$
Log likelihood (max)	$-9.586,2194$	$-9.628,9768$
$\chi^2(10)$	$1.711,99$	$1.852,69$
N.	16.069	16.069

The hypothesis of all coefficients on relevant effects being equal to 0 cannot be accepted and this is a first indication of the relevance of selected independent variables. On the other hand, the resulting values of the likelihood ratio index (also note as pseudo R^2) are quite low, being equal respectively to 13,35% for the logit specification and to 12,96% for the probit specification. However, it is useful to recall here that values of the likelihood ratio index between 0 and 1 have no natural interpretation as the standard R^2 and that, more in general, the issue of goodness of fit is not easy handled within discrete binary choice models, since the maximum likelihood estimator is *not* chosen to maximize a fitting criterion based on prediction of y, as it is in the classical regression (Greene, 1990, pp. 682-683).

A useful summary of the predictive ability of a binary choice model is the hit-and-missed table (also known as classification table) under the specification that $\widehat{y} = 1$ if $\widehat{F} > 0,5$ and $\widehat{y} = 0$ otherwise, where "$\widehat{\ }$" denotes predicted values.

We report 2 classification tables for the logit model, for both the unweighted and the weighted regression.

Table 5.1: Classification Table for y (logit unweighted)

	$\widehat{y}=0$	$\widehat{y}=1$	*total*	% of correct
$y=0$	6.151	1.890	8.041	$76,5\%$
$y=1$	2.815	5.213	8.028	$64,9\%$
total	8.966	7.103	16.069	$70,7\%$

Table 5.2: Classification Table for y (logit weighted)

	$\widehat{y}=0$	$\widehat{y}=1$	*total*	% of correct
$y=0$	39.450	9.666	49.116	$80,3\%$
$y=1$	17.550	22.887	40.437	$56,6\%$
total	57.000	32.553	89.553	$69,6\%$

The predictive ability of the logit model is approximately around 70% for both weighted and unweighted regression, though it arises as a differently weighted combination of correct predictions on positive and negative outcomes. This is a reasonably satisfying model performance, though once again a word of caution must be said since also the meaning of this kind of test is limited and very much dependent on the actual portion of positive and negative outcomes in the selected sample.

We report in table 6 estimated coefficients, t statistics (calculated with robust standard errors) and estimated marginal effects (at mean values of regressors) for the logit model. As expected, probit results are quite similar to logit ones (see the Appendix).

Table 6: Logit estimates (N=89.553)

	Coefficient	t-statistic	dy/dx
tang	$0,320$	$0,34$	$0,79\%$
growth	$-0,299$	$-4,17$	$-7,41\%$
size	$0,406$	$24,14$	$10,07\%$
amm	$0,234$	$0,83$	$5,82\%$
profit	$2,499$	$10,55$	$61,90\%$
dumnorth	$0,167$	$17,91$	$16,75\%$
taxpos	$-2,941$	$-16,03$	$-294,11\%$
dumind	$-0,024$	$-2,62$	$-2,46\%$
spa	$0,071$	$3,96$	$7,19\%$
alnat	$-0,236$	$-8,40$	$-23,65\%$
constant	$-2,452$	$-6,62$	

These preliminary results seem to provide the following preliminary indications.

First, in general the interest rate effect is either absent (*tang* is insignificant) or counterbalanced by other factors (*size* and *dumnorth* both have a positive sign, *growth* has a negative sign). The only variable which should be linked to the level of the interest rate and has the expected sign is *dumind*.

Second, the 'ability of adjustment' argument seems to be relevant and it counterbalances the interest rate effect determining a positive sign of coefficients on *size* and *dumnorth*. As for *size*, this ex-post preliminary result is in contrast with the ex-ante prediction by Staderini (2001).

Third, preliminary results do support the idea that constraints matter, since both the coefficients on $profit$ and *amm* are positive as expected, though *amm* is insignificant. The positive sign of the coefficient on $profit$ accords with Staderini (2001).

Fourth, the correlation between the use of the Dit and the 'Visco' incentive, and thus the possibility of a (mutual) reinforcement effect, is confirmed. The magnitude of the marginal effect of *taxpos* on the expected probability of y is remarkable.

Fifth, also the legal type of the firm plays a role, since cooperatives clearly use the Dit much less than other corporations (in a fiscal sense).

6 Further remarks

The Italian Dit, as the ACE, is not to be thought of as an incentive, but rather as a tool for neutrality. In other words, the logic of the Dit is liability-based since its objective is to reduce the bias in favour of debt-financing rather than to stimulate a specific kind of investment. Many of the critics of the Dit have rather adopted the opposite perspective, which can be termed as the asset-based one, as if the Dit had to be judged on the basis of the specific kind of assets which benefitted from reduced taxation.

In previous sections we adopted a mixed approach since, on the one hand, we tried to explain the choice to use the Dit in terms of the alternative between net equity and debt (adhering to the liability-based perspective) and, on the other hand, we have limited the attention to firms increasing their tangible assets, i.e . *investing* firms in a traditional sense.

Here we want to explore further the asset-based perspective to see what use of the net equity was made by DU. An appropriate analysis of the 40.437 DU would require data about the whole period, i.e. 1997-2000. However, data about the magnitude of assets and liabilities over this period are not available and we need to consider only DU firms which increased their net equity during year 2000. After weighting, they amount to 34.853 DU. We define for all these firms the following variables:

i) ΔNE, i.e. the variation of net equity;
ii) $\Delta DEBT$, i.e. the variation of debt;
iii) $\Delta TANG$, i.e. the variation of tangible assets;

iv) $\Delta SHARES$, i.e. the variation of long-term shares;

v) $\Delta TRADE$, i.e. the variation of credits and other short-term financial assets;

vi) $OTHERS$,i.e. the variation of other assets and liabilities.

where variations are differences between oustanding values at the end of year 2000 and outstanding values at the end of year 1999. We then construct a sort of representative balance sheet by reporting in Table 7 mean values of the listed variables as well as % increases with respect to 1999 mean values.

Table 7: Representative balance sheet for DU year 2000

	mean variation (.000 ITL)	on 1999 mean value
ΔNE	1.267.651	$41,27\%$
$\Delta DEBT$	2.266.020	$28,70\%$
$\Delta TANG$	1.017.715	$34,87\%$
$\Delta SHARES$	157.474	$15,77\%$
$\Delta TRADE$	1.250.117	$24,70\%$
$OTHERS$	1.108.364	$55,70\%$
N.	34.853	–

Table 7 indicates that DU have, on average, increased their debt, but, since in relative terms $\Delta NE > \Delta DEBT$, leverage has decreased from 1999 to 2000. Total assets have also increased, but 'financial investments', i.e. $\Delta SHARES$ and $\Delta TRADE$, increased less than other assets.

7 Directions for future research

The preliminary econometric results obtained in this paper shall be improved and strenghtened by moving towards different directions.

First, a different definition of relevant effects may be attempted in order to capture the relationship between the interest rate and the probability to be a DU. This is a viable alternative which has an informative cost since new definitions, especially those implying rates and proportions, may not apply to many firms which do not report the necessary information. In general the problem with the application of variables used in the financial structure literature (Titman and Wessels, 1988) is that here we have only 1-year data and not a panel (which should cover the whole period of application of the Dit).

Second, new variables may be defined, especially to describe the importance of the cost of equity as well as the tax position of the firm, since these approaches seem to shed some light on the choice to use the Dit. It is difficult to work further with the 'ability of adjustment' argument since proxies are arbitrarily chosen.

Third, regressions may be repeated after clustering data on the basis of some reasonable criterion such as size, location or sector of operations.

8 References

Amemyia (1981), Qualitative Response Models: A Survey, Journal of Economic Literature, 19.

Banca d'Italia (2000), Bollettino Statistico, 1.

Bond and Devereux (1995), On the design of a business neutral tax under uncertainty, Journal of Public Economics, 58.

Bond and Devereux (2003), Generalised S-Based and R-based taxes under uncertainty, Journal of Public Economics, 87.

Bontempi and Golinelli (1996), Le determinanti del leverage delle imprese: un'applicazione empirica ai settori industriali dell'economia italiana, Studi e Note di Economia, 2.

Bordignon, Giannini and Panteghini (1999), Corporate taxation in Italy: an Analysis of the 1998 Reform, Finanzarchiv, 56.

Bordignon, Giannini and Panteghini (1999), Reforming Business Taxation: Lessons from Italy?, International Tax and Public Finance, 8,2.

Franzosi (1999), Costo del capitale e struttura finanziaria: valutazione degli effetti di Irap e Dit, IRS, Contributi di ricerca, n.45.

Greene (1990), Econometric theory, Mac Millan, NY.

IFS Capital Taxes Group (1991), Equity for Companies: A Corporation Tax for the 1990s, Commentary No. 26, IFS, London.

Keen (2002), The Croatian Profit Tax: An ACE in Practice, 23,3.

Ministero dell'Economia e delle finanze (2003), Relazione Tecnica sullo schema di decreto legislativo in attuazione dell'art. 4. legge 7/4/2003 n.80, Roma.

Oropallo and Parisi (2004), Is the Italian Corporate Tax Reform Going to Reduce Firms'Tax Burden? A Microsimulation Analysis, presented at 60th IIPF Conference, Milan.

Panteghini (2001), Dual Income Taxation: The Choice of the Imputed Rate of Return, Finnish Economic Papers, 14.

Staderini (2001), Tax Reforms to influence corporate financial policy: the case of the Italian business tax reform of 1997-98, Temi di discussione, N.423, Roma.

Titman and Wessels (1998), The Determinants of Capital Structure Choice, The Journal of Finance, 43,1.

Vitaletti (2002), Giustizia e giustizialismo fiscale, in i Centogiorni ed oltre: verso la rifondazione del rapporto tra fisco ed economia?, a cura di E. Longobardi, De Agostini-Eti.

```
. logit presdit  tang growth size amm profit dumnorth taxpos dumind spa alnat
[pweight=riporto]

(sum of wgt is   8.9553e+04)
Iteration 0:   log likelihood = -11062.603
Iteration 1:   log likelihood = -9632.8606
Iteration 2:   log likelihood = -9586.6713
Iteration 3:   log likelihood = -9586.2195
Iteration 4:   log likelihood = -9586.2194

Logit estimates                                   Number of obs   =      16069
                                                  Wald chi2(10)   =    1711.99
                                                  Prob > chi2     =     0.0000
Log likelihood = -9586.2194                       Pseudo R2       =     0.1335

------------------------------------------------------------------------------
             |               Robust
     presdit |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        tang |   .0320083   .0954981     0.34   0.737    -.1551646    .2191813
      growth |  -.2992061   .0716855    -4.17   0.000    -.4397071    -.158705
        size |   .4066138   .0168406    24.14   0.000      .373607    .4396207
         amm |   .2348777   .2846866     0.83   0.409    -.3230977    .7928531
      profit |   2.499767   .2369756    10.55   0.000     2.035303     2.96423
    dumnorth |   .6881539   .0384289    17.91   0.000     .6128346    .7634732
    taxpos   |  -11.87821   .7410816   -16.03   0.000     -13.3307   -10.42572
      dumind |  -.0994947   .0380119    -2.62   0.009    -.1739967   -.0249927
         spa |    .288667   .0729524     3.96   0.000      .145683     .431651
       alnat |  -1.082608   .1289124    -8.40   0.000    -1.335272   -.8299441
       _cons |   -2.45254   .3704485    -6.62   0.000    -3.178606   -1.726474
------------------------------------------------------------------------------

. mfx compute

Marginal effects after logit
      y  = Pr(presdit) (predict)
         =  .45109284
------------------------------------------------------------------------------
variable |      dy/dx    Std. Err.     z    P>|z|  [    95% C.I.   ]      X
---------+--------------------------------------------------------------------
    tang |   .0079255      .02365    0.34   0.737   -.03842  .054271   .191408
  growth |  -.0740858      .01775   -4.17   0.000  -.108881 -.039291   .255068
    size |   .1006809      .00416   24.18   0.000   .092522   .10884   14.6484
     amm |   .0581576      .07049    0.83   0.409  -.080001  .196316   .002745
  profit |   .6189625      .05868   10.55   0.000   .503959  .733966   .084191
dumnorth*|   .1675123      .00909   18.42   0.000   .149687  .185337   .598326
taxpos|      -2.94114      .18459  -15.93   0.000  -3.30292 -2.57936   .353290
  dumind*|   -.024619       .0094   -2.62   0.009  -.043036 -.006202   .451511
     spa*|   .0719188       .0182    3.95   0.000   .036249  .107589   .107241
   alnat*|   -.236545      .02274  -10.40   0.000  -.281111 -.191979   .038983
------------------------------------------------------------------------------
(*) dy/dx is for discrete change of dummy variable from 0 to 1

. probit presdit  tang growth size amm profit dumnorth taxpos dumind spa alnat
[pweight=riporto]

(sum of wgt is   8.9553e+04)
Iteration 0:   log likelihood = -11062.603
Iteration 1:   log likelihood = -9650.8938
Iteration 2:   log likelihood = -9628.9953
Iteration 3:   log likelihood = -9628.9768
```

```
Probit estimates                                  Number of obs   =      16069
                                                  Wald chi2(10)   =    1852.69
                                                  Prob > chi2     =     0.0000
Log likelihood = -9628.9768                       Pseudo R2       =     0.1296

------------------------------------------------------------------------------
             |               Robust
     presdit |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        tang |    .036272   .0600708     0.60   0.546    -.0814646    .1540086
      growth |  -.1731699   .0383256    -4.52   0.000    -.2482867   -.0980532
        size |   .2414962   .0098548    24.51   0.000     .2221811    .2608113
         amm |   .1506068   .1908611     0.79   0.430     -.223474    .5246877
      profit |   1.456743   .1382452    10.54   0.000     1.185788    1.727699
    dumnorth |   .4202932   .0231747    18.14   0.000     .3748716    .4657148
    taxpos   |  -6.170304   .4586637   -13.45   0.000    -7.069268    -5.27134
      dumind |    -.05751   .0229943    -2.50   0.012     -.102578   -.0124421
         spa |   .1704016   .0431972     3.94   0.000     .0857367    .2550665
       alnat |  -.6208686   .0707765    -8.77   0.000     -.759588   -.4821491
       _cons |  -1.790696   .2273435    -7.88   0.000    -2.236281   -1.345111
------------------------------------------------------------------------------

. mfx compute

Marginal effects after probit
      y  = Pr(presdit) (predict)
         =  .44921081
------------------------------------------------------------------------------
variable |      dy/dx    Std. Err.     z    P>|z|  [    95% C.I.   ]      X
---------+--------------------------------------------------------------------
    tang |    .014353      .02377    0.60   0.546  -.032237  .060943   .191408
  growth |  -.0685242      .01517   -4.52   0.000  -.098251 -.038797   .255068
    size |   .0955612      .00389   24.54   0.000   .087929  .103193   14.6484
     amm |   .0595959      .07552    0.79   0.430   -.08843  .207621   .002745
  profit |   .5764405       .0547   10.54   0.000   .469238  .683643   .084191
dumnorth*|   .1641215      .00886   18.53   0.000   .146761  .181482   .598326
taxpos   |   -2.44162      .18166  -13.44   0.000  -2.79767 -2.08557   .353290
  dumind*|  -.0227457      .00909   -2.50   0.012  -.040557 -.004934   .451511
     spa*|   .0677735      .01721    3.94   0.000   .034044  .101503   .107241
   alnat*|  -.2243677      .02191  -10.24   0.000  -.267317 -.181418   .038983
------------------------------------------------------------------------------
(*) dy/dx is for discrete change of dummy variable from 0 to 1



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```